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GUIDIMAKA INTEGRATED RURAL DEVELOPMENT PROJECT (682-0201)

INTERIM EVALUATION

ISLAMIC REPUBLIC OF MAURITANIA

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U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

EVALUATION REPORT: MAY, 1982

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GUIDIMAKA INTEGRATED

RURAL DEVELOPMENT PROJECT

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INTERIM EVALUATION REPORT

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GUIDIMAKA INTEGRATED RURAL DEVELOPMENT PROJECT

(682-0201)

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INTERIM EVALUATION: FEBRUARY - MARCH, 1982

1. INTRODUCTION

The central purpose of this interim project evaluation was to analyze the technical progress of project activities and to evaluate their economic impact and acceptance by the local population. Other evaluation objectives were to review the financial status and the viability of the administrative framework of the project. With this information in hand, the evaluation team was to formulate recommendations for project execution during the remaining life of the current project and to review future options.

The evaluation was conducted as a joint exercise involving personnel from the Mauritanian Ministry of Rural Development, the regional administration of Guidimaka, the technical assistance contract team and personnel from USAID/Mauritania and REDSO/WA, Abidjan. A field visit and data collection trip, including Selibaby and the surrounding Direct Intervention Zone (DIZ), was made from February 17-21, 1982. This trip involved the participants listed on the following pages and covered the three principal demonstration sites (Katamangue, Singha and Niarouwalle), the range improvement site at Guidebine, as well as seven villages within the DIZ and the project tree nursery and vegetable garden demonstration site.

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Discussions with community members regarding the impact of the project were held at each village site visited, including: Danguérimou, Kininkoumou, Diala, Diégui, M'Békhéré, Coumba N'Dao and Bouroudji. Discussions with pilot farmers were also held in Selibaby itself.

The field trip effort was followed by several review sessions in Nouakchott to discuss findings and the production of a series of written analyses-technical, economic, social, administrative and financial--which are included in this report. All the analyses are summarized in this report. Further detailed information is provided in the annexes.

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PROJECT TEAM

ADMINISTRATION

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* Attended only Nouakchott briefings.

** Due to other work commitments, Dr. Bronson's trip to Selibaby preceded that of the full evaluation team.

2. EXECUTIVE SUMMARY

The purpose of the Guidimaka Integrated Rural Development Project is: (1) to develop technically sound and socially acceptable methods for increasing crop and animal yields among the sedentary inhabitants in a limited zone of the Guidimaka region, and (2) to carry out on-farm trials as preparation for broader extension efforts. Initial logistical difficulties delayed the beginning of the activity in such a manner that most technical work was not begun until 1980 and significant results, aided by improved rainfall, not obtained until 1981. Despite these delays, it is the judgment of the evaluators that the project has made significant progress.

Of greatest importance have been the research work and demonstration activities conducted with improved cereal varieties and cultural practices. Results obtained to date indicate that cereal yields can be improved on the order of one-hundred percent through use of the new varieties and improved cultural techniques. Promising research and demonstration work has also been initiated in the field of forestry; however, an improved extension methodology must be developed to further promote the planting of forest and forage species at the village level.

Work in the range management field has assisted in demonstrating the usefulness of management concepts in regenerating over-used and deteriorating land. However, further progress in this field

will be blocked unless a strong national range land policy is developed which will promote controlled access to the land. In the field of animal health, development of activities has been constrained by lack of technical assistance during long periods of the project. Current assistance and demonstration of animal health care techniques will generate short-term benefits, but the means must be found to firmly institutionalize the capability to replicate these techniques within the Animal Health Service.

In fact, the aspect of institutionalization must be emphasized in all areas of project activity during the remaining life of the project. The high degree of mutual cooperation which currently exists between the expatriate technicians, their immediate counterparts and the regional and national authorities responsible for this project is to be commended and should serve as a model for other USAID-GIRM activities. However, the project itself has become an institution, responsible for a large portion of the financial resources and manpower directed toward development in the Selibaby area. Efforts must be directed in the future toward promoting further Mauritanization of the administrative and financial control of activities currently carried out through the project. The scale of any future effort beyond the current project must take into thorough consideration the Mauritanian capability to support recurrent costs over the long run. The current project has deliberately concentrated the bulk of its efforts on a small number of participant

farmers and herders, perhaps 200, in order to gain their confidence and to reinforce the technological lessons being learned by this small group. The results are admirable. The evaluation team was much impressed by the local population's expression of support and willingness to work with the project staff in undertaking new development initiatives. In the future however, proven interventions must be extended on a much broader scale. If not, development costs will continue to exceed benefits. Future efforts must focus on the development of an effective, less expensive form of extension which can promote worthwhile interventions throughout the Guidimaka and beyond.

Financial and technical resources are clearly adequate to complete the current activity which is scheduled to terminate in December, 1982. However, the current financial constraints placed upon USAID preclude continuing the level of direct support which has been provided in the past. USAID will analyze the prospects of including promising activities from the GIRD project under the umbrella of its proposed Agricultural Sector Grant and Food for Peace (P.L. 480), Title II, Section 206 programs. The possibility exists that some aspects of the project's activities such as animal traction training and dry land cereals research could receive some support through coordination with planned OMVS programs such as the Integrated Development Project or the second phase of the Agricultural Research project.

In any case, it is highly unlikely that new USAID funding in any

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form would be available in time to continue to support any aspect of project activity as of January, 1983. Although AID/Washington has indicated in the past its opposition to any extension of the life of the current project, the possibility should still be considered of utilizing existing funds to prolong the life of the current project.

Regardless of the timing or magnitude of USAID financing, efforts should be made to integrate the programming of the GIRD project more closely with other donor activities. Such projects as the proposed Southwest Mauritania Livestock Project, to be financed by the World Bank, and the FED's gum arabic reforestation program are examples of potential collaborative links with the GIRD project. Such collaborative opportunities must be fully exploited in order to produce a cost-effective, integrated development package for the entire Guidimaka region.

3. TECHNICAL ANALYSES - SUMMARY

This section summarizes the technical aspects of project activity and notes the principal findings of the evaluators. Detailed descriptions and analyses are found in the following annexes: Annex A - C, agronomy; Annex D - E, range management/environmental protection and livestock; and Annex F, small project activities.

A. Agronomy

Of great importance to the status of the agronomic work is the

fact that current results of the research and demonstration aspects are based heavily on one season's activities. In 1979, no agronomist was in the field and the efforts of other technicians were concerned in developing the necessary infrastructural base for the project. In 1980, a poor rainfall pattern disrupted much of the trial and demonstration work. Only in 1981, despite a still below-average rainfall of some 450 mm. in the Selibaby area, were significant results obtained from the agronomic trials and demonstrations.

* Varietal Trials. A series of varietal trials have been designed to select strains of food crops which are higher yielding and more disease and drought resistant than traditionally used varieties. The work is focussed on sorghum, millet, maize, cowpeas and peanuts. Results from the 1981 season show strong yield increases for certain varieties of sorghum and cowpeas. In fact, the results are so striking for certain varieties such as the E 35-I sorghum, that technical reviewers indicate that on-farm trial work should be accelerated with a view toward making these more widely known and available in the region. A number of variety trials failed this past season, including many of those involving corn and millet, because of poor germination or lack of sufficient moisture. These and trials involving all other tested crops will be repeated this coming season to provide greater confidence in the data generated and to continue exposure of new varieties to the particular environment of the Guidimaka region.

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The project is commended for its thorough utilization of international research centers maintained by such organizations as SAFGRAD, ICRISAT and IITA, as well as a number of U.S. universities. Many of the seed varieties tested have been obtained from these institutions.

* Cultural practice trials and demonstrations have been designed to test new practices against traditional methods to determine which produce superior results and then to demonstrate proven cultural improvements to the local population. Practices include plowing with animal traction, plant spacing, intercropping, fertilizing with organic materials and water retention techniques such as cross slope ridge culture. A number of the cultural practice trials (intercropping and spacing for certain crops) only confirmed the efficacy of existing traditional practices. However, introduction of a package of improved cultural practices on demonstration fields (seed treatment, plowing with animal traction, early thinning, weeding, etc.) produced yield increases on an average 50 percent higher than traditional techniques. Particular importance was placed by the evaluators on the need to continue experimentation and demonstration on those techniques which foster water retention, such as the cross slope ridge method. Also noted was the need to treat insects and pests in a systematic fashion. Pest management was not specified as an activity of the Guidimaka project, while the GIRM lacks adequate manpower and resources to deal effectively with the problem.

* Promotion of the use of animal traction is being undertaken, for plowing in particular, but also for water lifting and

general hauling. This effort is being carried out through training animals and individuals at 5 demonstration/training centers based in villages throughout the DIZ. The advantages of animal traction are then demonstrated by using the trained animals on the fields of local pilot farmers in association with other improved techniques. Traction equipment is made available at cost to the local farmers through the project.

Animal traction has been shown to be efficacious in improving yields and also in expanding cultivated hectarage. Trials have shown yield improvements of some 15 percent for fields plowed by animals versus hand cultivated fields. Some pilot farmers noted during the course of the evaluation that they were able to put 3 to 4 times as much land into production utilizing animals than was possible using hand cultivation techniques. The difficulty in extending animal traction on a wide scale is the substantial cost of acquiring not only the animals but also the necessary equipment. Without an adequate credit mechanism, prospects for extending this technology will remain limited.

* Extension of proven improvements is conducted through the organizing of community meetings to sensitize villagers to the existence of new techniques, organizing visits to the project's own demonstration sites at Singha, Katamanghé and Niarouwalle and demonstrating the worth of the new techniques and varieties in the village fields of selected pilot farmers. In many respects, this extension effort was grafted onto an existing project whose original focus was research. The project evaluators note that

this aspect of the agronomic activities in particular requires expansion. Such expansion implies an enlarged program of training for those personnel involved in the extension effort and the provision of more technical aids to these individuals to assist them in reaching the region's farmers. Contacts between the project and such entities as ENFVA, the national agricultural school, CNRADA, the national research center, SONADER and other USAID and other-donor projects will no doubt yield important sources of technical documentation and other aids which can be further utilized by the Guidimaka project extension effort.

* Vegetable gardening is also being supported by the project through the provision of improved seed and nursery plants, demonstration of cultural practices and through another facet of the project's activities, development of wells which are used partially to water the gardens. This is an activity highly appreciated by the local population since it produces dietal variety and often supplementary income during the dry season when time is available to devote to such activities. It is recommended that results obtained through USAID's Vegetable Production Project and other projects with an interest in vegetable production such as the Luthern World Federation effort at Barkeole be closely examined for applicability to the GIRD project's work in this field.

B. Range Management and Livestock Interventions

These two aspects of project activity will be considered together since they are closely interrelated in practice. Once again, the research components of these activities have been hampered by the need to create the necessary infrastructure during the first

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season and the need to replace at various times the technical advisors associated with these components. The present advisor in range management arrived September, 1980; the present livestock advisor arrived in October, 1981.

*Water catchments. Prior to the beginning of the brief rainy season in the Guidimaka, many watering points for livestock run dry. An attempt was made to alleviate this situation through the construction, by hand, of water catchment basins. Three such basins were dug. However, the hand-dug techniques proved to be extremely costly and time consuming. Problems were also encountered with high rates of evapotranspiration, but more particularly with porosity of the basin itself. In short, hand dug basins are not extendable. A new approach will be taken this season employing a bulldozer as was done for the USAID project in Bakel, Senegal. The already existing basin has been lined with concrete in an effort to correct the porosity problem. These obviously experimental actions must be closely studies from an economic viewpoint and to assess the likelihood of replication by the government or other entity once the project is completed.

* Forage species trials. A series of forage species trials are being conducted to analyze the viability of growing improved forage products in the region. Some promising results for leucoena and a few other varieties have been obtained. However, the evaluators have noted the difficulty of promoting the seeding and protection of this forage material on a large scale, particularly in the absence of a strong national law supporting the protection of range lands.

* Forage Reserves. Much the same analysis applies to the concept of creating forage reserves. The Katamanghá project site serves as an excellent demonstration of how local range land can be regenerated provided that it is adequately protected. However, the protection in this case consists of barbed-wire fencing which is economically beyond the reach of the local villagers themselves. The argument has been made that such reserves can be established utilizing only local villagers to guard the perimeter. A counter-argument runs that some wire is necessary if only to symbolically mark the boundaries of the reserve. Once again, the ultimate difficulty rests in the nature of the system of transhumance in the region and the legal complication involved in setting aside pasture land for the exclusive use of one particular group of citizens.

The project hopes to work with several villages this next season in the establishment of small forage reserves. While the concept is interesting, replication is not possible on a wide scale given the current policy constraints.

*Supplementary Feeding. Regarded as much more promising by the evaluators was the project's experiments with food supplements - concentrates, mineral blocks and particularly the feeding of sorghum stalks gathered from local fields. Mineral and other additives are affordable to many of the local inhabitants and have been demonstrated to have a marked impact on maintenance of animal weight, particularly during the early summer months when temperatures are high, rain has only just begun to fall and the range is in its worst condition. Gathering and storing of sorghum

stalks for feed has great potential since the material is readily available in farmers' fields. Transportation is the major problem since the necessary carts are often lacking. Storage techniques must also be extended so that the material may be properly preserved.

* Carrying Capacity Trials. Work with supplementary feeding is being carried out in conjunction with a series of actions designed to judge the carrying capacity of the range. These experiments are being carried out on the Katamangué project site which has been subdivided into 4 blocks, with each block carrying a different mix of animals (cattle, sheep and/or goats) at varying densities per hectare. Each group of animals is in turn allowed to feed on a different mixture of natural forage and supplemental feeds. The experimental design is further described in the technical annexes.

The technical evaluators are of the opinion that there are too many variables at work in these experiments to obtain useful information on the carrying capacity of the land and that such information, if obtained, would be of extremely limited utility given the current policies, or lack of such policies, which govern range management in Mauritania. This last factor, in fact, hampers the extendability of many of the project actions related to range management with a few exceptions such as the supplementary feeding activities.

* Animal Health. All actions undertaken by the project in the field of animal health are coordinated with and conducted in association with the Mauritanian Animal Health Service. The animal herd on the Katamangué range serves as a unit for demonstrating proper animal health care (vaccinations, deworming,

measures against external and internal parasites, etc.) to the local population. The expatriate technician, who is a veterinarian, has assisted the Animal Health Service in vaccination campaigns and other actions designed to improve the health of local animal herds.

An important innovation fostered by the project is the sale of veterinary drugs and supplies through the project to the villagers. Formerly, nearly all drugs were provided free by the government whose supplies were occasionally inadequate or exhausted. Through its revolving fund activities, the project has purchased stores of veterinary medicines which have been sold to local livestock owners at cost. This operation has proven successful and indicates the importance attached by the people to the health of their animals and their willingness to support it with their own resources. Investigation must be undertaken as to whether the program can be institutionalized within the Animal Health Service. Does it now have the resources and the administrative capacity to continue to promote such a program? If it does not, are there other actors --possibly in the private sector--which might assume this function? During the last months of this project the technical assistance team should focus much of its effort on analyzing these questions regarding institutionalization and promoting its development.

One answer to the institutionalization problem may lie in the project's experiments with the development of village level

pharmacies. Efforts are now underway to train local volunteers in a fashion not dissimilar to the approach utilized to train village health workers under USAID's Rural Medical Assistance Project. Trainees will be provided with a foundation of knowledge with which to recognize basic signs of disease and basic veterinary materials will be made available for sale through the local pharmacies. This program, however, is only now getting underway. Experience in the Rural Medical Assistance project indicates that the establishment of such a pharmacy system is a complex, time consuming process. A key factor in the potential success of the program lies on the willingness of the Animal Health Service to act as a catalyst in promoting and extending such a system, given the limited time remaining to develop the program under the current project.

C. ENVIRONMENTAL PROTECTION

The environmental protection aspect of the project is focussed on forestry. The Guidimaka region was formerly widely forested, but has suffered great losses due primarily to the drought and subnormal rainfall conditions which have existed since the late 1960's. A tree nursery has been developed which is engaged in producing seedlings of the common local varieties and also a series of experimental varieties for use in testing adaptability to the Guidimaka environment. Some 30,000 trees have been produced and planted, the majority on the project's own demonstration sites. Trees have also been made available to villagers at a cost of UM 5 (10 U.S. cents) a seedling. The project's own

testing and demonstration program is directed toward a wide range of end uses including:erosion control, living fences, forage and shade. To date, purchases of trees by villagers have been made mostly for shading, which is thoroughly understandable given the intense heat during much of the year in the region.

Extension efforts in forestry have been hampered since demonstrations in this field require a long-term commitment of resources and manpower in order to generate positive results--an effort which is now only beginning under the auspices of this project. To date, the experimentation with new varieties has not yielded strong results with the exception of a few forage varieties such a leucoena.

A small portion of the Katamangué demonstration area has been fenced off as it contains one of the most densely forested areas in the immediate environs of Selibaby. It is becoming a refuge for deer and other local animal life and may serve as a local model of the benefits to wildlife of such reservations in Mauritania. Another aspect of environmental protection which is very important in the Guidimaka, as elsewhere in Mauritania, is fire control. Initially, the project was designed to place much emphasis on the establishment of firebreaks. Later, the efficacy of firebreaks was questioned and they were largely eliminated from the project. Only the demonstration sites themselves were encircled by firebreaks by the project. While no formal study of the worth of firebreaks has been conducted, observations of the effectiveness of roads in halting fires in the region has lead

the project team to conclude that construction of firebreaks in the region would be very worthwhile. The bulldozer which will be employed primarily for the construction of water basins can and should also be utilized for the construction of firebreaks in the DIZ when time and weather permits.

D. SMALL PROJECTS

This aspect of project activity was incorporated as part of the project paper amendment approved in June, 1981. Many of the project's activities being previously research oriented with long-term returns only, the project was in need of a mechanism to show good faith with the villagers by providing them with some form of useful, concrete action with an immediate pay-off. The program of small-scale infrastructural projects has more far reaching benefits as well since such features as schools and wells, the primary elements of the programs, are factors in stemming the flow of the rural population out of the region. The benefits of a well in terms of human health as well as to animals and agriculture, in villages where no wells previously existed, are obvious.

Thus, these projects have served as an important tool in opening the door for the project to present its ideas and concepts on more difficult and less tangible subjects. That is not to say that even these simple infrastructural innovations--and they are innovations in the village context in Guidimaka--have been easily accepted. Much patience and effort were initially required on the part of project personnel to overcome suspicion and tradi-

tional points of view. Once accomplished however, the benefits derived from the resultant infrastructure now foster a more open mind for other innovations in the agricultural, and livestock fields.

There is another element of this program which is significant. This is not a program without a price in terms of village contributions of labor and materials. The project itself supplies only a maximum of UM 50,000 (U.S.$1000) or 25 percent of the total cost of the project, whichever is less, for imported materials such as cement and iron. Often, skilled labor is brought in to assist with the more technically complex tasks. All other labor and local materials are the responsibility of the village itself. This example of community participation and the mobilization of local resources to assist in development tasks is one which should serve as a model for other USAID/GIRM activities in Mauritania.

4. ECONOMIC ANALYSIS

The economic benefits anticipated from the GIRD project include increased output of cereals and vegetables and better management of livestock, range and forestry resources. In order to evaluate the agronomic potential properly, the project must be placed in the context of Mauritania's overall efforts in moving toward food self-sufficiency.

Agronomic Benefits - Overall Background

During the 1960's, some 270,000 hectares of land were tilled throughout Mauritania and the annual production of cereals, averaging slightly over 100,000 tons, was sufficient for local consumption. During the drought years of the early and mid-1970's, the area of land tilled fell well below 200,000 hectares and the average production of cereals throughout the 1970's was about 50,000 tons annually. During the 1981/82 harvest season, rainfall was fairly abundant and cereals output approached 80,000 tons. Since consumption is now close to 200,000 tons annually, Mauritania continues to have an extreme dependence upon commercial imports and food aid.

The Guidimaka region is slated to play a pivotal role in the GIRM's efforts to make progress in food self-sufficieny for two reasons: 1) one fourth of the Senegal river irrigated area expected to be added during the current four-year plan period ending in 1985 is from the Guidimaka border area. This ratio may well hold for the general development activities planned over the next 20 years for irrigation in the Senegal River Basin. 2) The 600 milimeter rainfall isohyet passes half-way through the region with the result that the present yields from rain-fed cultivation are the highest in the country. With the added security attendant upon the plentiful rainfall, the potential for a strong, expansion of yields may also be comparatively high.

Project Agronomic Benefits

No figures are available concerning present production in the DIZ, a circle with a 20-kilometer radius from Selibaby. A baseline estimate is, however,necessary for evaluating future potentials and can be derived demographically. The population of Guidimaka is about 90,000, and, taking into account the relative areas of the DIZ and the whole region (1,256 and 10,300 square kilometers respectively) and the population of Selibaby (6,000) and the other much smaller villages, the population of the DIZ may be one sixth as much, or 15,000. GIRM figures indicate that the cultivated areas of Guidimaka may be about 22,000 hectares. Applying the one-sixth population ratio to the cultivated areas, the cultivated area of the DIZ may be about 3,600 hectares.

GIRM figures on rain-fed cereal yields for the Guidimaka area as a whole are around 580 kilograms per hectare, while the figures cited by Mr. Quan Minh Doan, the GIRD agronomist, for traditional yields in 9 farms in and around Selibaby average 1300 kg/ha. There is in fact only one figure cited by Quan which is below 1,000--790; the other figures are as follows: 1930,1105,1095,1360,1185,1640,1255 and 1255. We have decided therefore to use a figure of 1000 kilograms per hectare in at least the DIZ region and that therefore the DIZ output per year is about 3,600 tons, valued at $1.5 million. A rough estimate of the area devoted to vegetables in the DIZ is about 2 hectares with an annual production of 20 tons valued at $11,000.

New techniques, including animal traction, have resulted in yield increases varying from 32 to 90% during a single season; the average was about 50%. The use of new seeds might also cause yields to be 50% higher than with the presently used seeds: a test of nine varieties of new seeds yielded an average of 2300 kilograms per hectare compared to an average of 1400 kilograms with traditional seeds. Very little progress has been made during the previous two seasons on agronomic trials because of the absence of any agronomist during the first season and a combination of severe drought and an agronomist with poor local working relationships during the second. About 200 farmers were directly influenced by the project during the one productive season. At that rate, it would take about five years more to reach directly one half of the farmers in the DIZ. Obviously, many more farmers will be reached by indirect spread effects of the project. The potential yield increase for the DIZ as a whole from both the use of new seeds and from improved techniques for these additional years would then be about 50%, or 8% per year. Yield increases for the succeeding eight years both within the DIZ and increasing outside it might amount to 5% per year.

Project activities should also bring additional land into production. An analysis of two dozen cases with the use of animal traction indicates an average doubling of land brought into production. Some 40 carts and yokes have already been distributed by the project and extensive training has been afforded in their use. A $330,000 FAC-financed project has also supplied a couple of dozen animal traction units, but without any resident advisers or training. The main stimulus to the increased use of animal

traction equipment is clearly the GIRD project both because of its larger size and because of the value of the training afforded. We assume that the project will cause over-all cultivated areas to increase by about 3% per year for the five additional years and thence by about 2% per year. Three caveats need to be made concerning the possibilities of encouraging the use of animal traction: 1) a limiting factor eventually on the expansion of cultivated land will be the availability of good land as increasingly marginal land comes into production; 2) a revised appraisal by Mr. Quan Minh Doan, the GIRD agronomist, on the economics of animal traction concludes that the benefits over a five year period are substantially above costs. This appraisal covers several factors which could vary widely according to actual experience, including the receipts from transportation uses and whether yields will indeed rise on the average by 50% with the use of animal traction. The appraisal also omits learning and repair costs which are presently absorbed by the project. In any case, there seems to be very little private purchasing of animal traction equipment despite the availability of substantial emigrant remittances. This may be a reflection of farmer doubt on the economic feasibility of animal traction or merely that he needs encouragement and favorable experiences from others before adopting a new technology. 3) a constant theme in several of the villages is that farmers cannot afford the $400 purchase price of the animal traction equipment without credit afforded through the project. Credit is therefore a necessary element in any program to continue the dissemination of animal traction equipment. A general

general region-wide or even country-wide agricultural credit system is indeed one of the central recommendations of this evaluation to help spur the introduction and extension of new techniques, seeds and other key inputs.

We have thus assumed an 8% per year increase in yields for five additional years followed by 5% per year thereafter. Cultivated areas might increase by 3 and 2% per year respectively for a combined growth rate of 11 and 7% per year respectively. There needs to be deductions for incremental input costs associated with the improved techniques and also for the "without project" scenario. These deductions throughout might be 1 and 2% per year respectively. The adjusted growth rates for the two periods would thus be 8 and 4% per year respectively.

A major activity of the GIRD's infrastructure projects is the building of wells. Wherever these are built, the output of vegetables rises dramatically. Variety trials and new tilling and growing techniques are also causing yields to grow strongly. Since present production is only a modest 20 tons, we believe that an annual incremental benefit stream can show annual increases of 20% per year for the next five years, followed by 10% annual increases thereafter even after allowing for the without project scenario and deducting incremental input costs. The incremental benefit stream for the agronomic activities can be presented as follows:

	Vegetables (000$)	Growth Rate	Cereals (000$)	Growth Rate
1	11	0	1,150	0
2	11	0	1,150	0
3	12.1	10	1,196	4
4	14.5	20	1,292	8
5	17.4	20	1,395	8
6	20.9	20	1,507	8
7	25.1	20	1,628	8
8	30.1	20	1,758	8
9	33.1	10	1,828	4
10	36.4	10	1,901	4
11	40.0	10	1,977	4
12	44.0	10	2,056	4
13	48.4	10	2,138	4
14	53.2	10	2,223	4
15	58.5	10	2,312	4
16	64.4	10	2,404	4

Total costs of the project for the intial four year period is $6.15 million (USAID contribution) and $1.67 million (GIRM contribution). A detailed breakdown of costs by functional activity is not available, but an examination of all cost data leads us to conclude that 40% of the costs can be attributed to agronomic activities, or $3.1 million. This figure is in excess of the total net benefit stream ($1.8 million). Since however, the first two seasons were wasted from the agronomic point of view (lack of an agronomist or poor rainfall), one may be justified in treating these two seasons as lost and only calculating with

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the costs of the 1981 and 1982 seasons ($5.4 million times 40% or $2.2 million). This calculation still yields a slightly negative IRR.

These calculations have an important policy making implication. On the one hand, there is the argument by Dr. Goldensohn, contract team leader supported by Dr. Bronson, REDSO/WA agronomist, that traditional techniques are closely held by the rural communities and that they can only be replaced by new techniques if a close relationship of trust develops between farmer and extension agent. Agents thus have to work intensively with only a few farmers in the first few years of on-farm trials; if the pace of dissemination is too fast, this argument runs, mistrust may develop among many farmers and a reversion to traditional practices may take place. Operating on this methodology, less than 200 farmers have been trained directly by the project by the time of this evaluation. Many more have been influenced by project activity. (Note: In the annexed report by Bronson, REDSO/WA agronomist, there is the assessment on progress toward project objectives under Magnitude of Outputs, "2) 150 farmer participants thoroughly trained. PARTIAL. 15 pilot farmers + 155 contacts").

Following the argument for intensive contacts with few farmers, on the other hand, leads to a project which can not be defended on economic grounds. All evaluation team members are agreed that an excellent research base has been established by the project and that very good working relationships exist between project personnel, local government officials, and village farmers. The problem is the pace of extension. If ways

could be found to launch a much more vigorous extension effort inside and outside the DIZ and to expand an effective agricultural credit system throughout the region, as recommended by the evaluation team, the project could become strongly economic and, at the same time, greater progress would be made towards the GIRM's over-riding goal of food self-sufficiency.

Other Benefits

The benefits anticipated from better management of livestock, range and forestry resources are well described in the technical reports and will only be briefly summarized here. Training has been or will be provided for nine counterparts in Senegal or Nouakchott and on-the-spot training has been provided for 15 animal trainers, 5 extension workers in animal health and husbandry and 4 in range management and forestry as well as 1 vegetable extension worker and 8 other agricultural extension workers. Local woodcutters have learned how to make yokes and local blacksmiths have become used to making repairs on carts and plows as a result of project activity. Health treatment has been afforded to 100 cattle, 124 sheep and 84 goats and, while veterinary medicine used to be provided free by the GIRM, such sales through the project have totalled UM 433,000. 13,669 cattle have been vaccinated under the project and research on the cost/benefit value of feed supplementation demonstrates that such a program in June is especially worthwhile. Some 40,000 seedlings have been distributed by the project at a subsidized price of UM 5 each. The economic value of these seedlings could easily

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approach $40,000. The fencing used by the project is considered so expensive as not to be replicable. Live fences combined with minimal wiring and an extensive education campaign are rather what are considered economical measures for land delimitation. The lack of legislation or regulations limiting pasture use between residents and nomads has dampened the motivations of people nearby to carry out major improvements such as planting trees or leguminous species. Project personnel are prepared to devote a greater percentage of the nurseries to gum arabic and to assist villagers in the creation of forage reserves for use during drouhgts. Both of these proposals seem to be sound economic propositions.

5. SOCIAL ANALYSIS

Approach and Methodology

Success of project interventions in terms of social acceptability has been achieved through the open and adaptive behavior of the technical assistance team members and their willingness to integrate the personal insights and experiences of their Mauritanian counterparts into the fabric of the project's technical research and demonstration activities. Because of this adaptability, and the direct assistance provided to communities in the form of wells, schools and other small activities, the project has now gained the full confidence of the general population in the DIZ. This is a remarkable achievement in a cultural milieu which is marked by a guarded and often suspicious approach to outsiders.

To date, this success can be largely attributed to the intuitive sensitivity of the project team members, both local and expatriate. In order to assure the replicability of project interventions after the current team disbands, several actions must take place. First, any socio-economic and demographic data which has been collected by the current team must be aggregated, analyzed and reported on in a systematic fashion. In addition, for serious development planning, a much deeper probe of the realities of communities, peoples and activities is needed. This would include not only quantitative data but qualitative assessments of the organizational characteristics of each specific community and important regional activities such as marketing, credit, and distribution of remittances from abroad. The team leader/sociologist has not been able to accomplish this task because of his heavy load of administrative responsibilities. Time and resources must be made available so that this important task can be accomplished.

Secondly, the resultant data base must be utilized to produce a methodological framework within which can be developed a rational strategy for regional development in the Guidimaka. This strategy would incorporate the current team's experience, and the suggested further analysis of the various patterns of participation, work and communication which exist in the area.

Participation

The initial project design documentation focussed on the idea of utilizing cooperative forms of organization, such as a livestock

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association, as the vehicle for local participation in the project. As the project was implemented, it became clear that its resources were insufficient to undertake the complex task of assisting in the development of a systematic program of cooperative organization in the Guidimaka region. In fact project experience brings into question the very adaptability on a large scale of the cooperative idea. Apparently in the Guidimaka there exists a spectrum of communities that ranges from very independent Fulbe hamlets, to disorganized Haratin communities, to very strongly patriarchial Soninke villages. The former seem often incapable of organizing themselves for permanent cooperative ventures. In the latter, the extended family is already a defacto cooperative, whose established patterns and power structures are threatened by new cross family cooperative actions.

In those villages where cooperative organizations have begun to develop, such as Coumba N'Dao, the project has oriented its demonstration activities through the cooperative. But in general, the project has relied more heavily on a volunteer, pilot-farmer approach operated in tandem with "sensitization" campaigns to make villagers aware of project benefits through mass meetings, visits to the project's demonstrationsites and review of the results on the pilot farmer's plots.

This form of participation allows for a great degree of concentration on a small number of individuals with the objective being to ensure successful results. Such success serves as a stimulus to other farmers to emulate the package of improved techniques in-

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troduced by the project. Another advantage of the small numbers is the ability of the technical assistance team to reinforce the lessons required to fully integrate the new technical innovations with traditional patterns of work. While the level of technology being transferred is for the most part simple and easily understood, the recipient environment is highly traditional and often resistant to innovation. The small numbers of volunteer participants allows a level of involvement with technicians which is aimed at building sufficient confidence in the new methods so their adoption will be permanent.

The major drawback to this approach is its costs. Much confidence has been developed by the local population in the team and its activities. Yet, the spread effect of project interventions is not yet self-sustaining on a region-wide scale, possibly because the on-farm trial approach has only been in use for one season. It is evident that future work must make use of a more cost-effective approach to participation if the results are to be economically justifiable.

The question is not one of forcing people to participate but of discovering why people don't participate and then overcoming the obstacle. Questions such as ability to support risk, conflicting authority, lack of credit, labor bottlenecks, miscomprehension, inferior social status, etc, are all factors that can prevent participation and which require specifically designed strategies

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and actions on the part of development personnel that are targeted to resolving the particular problem. Again, the project on an individual basis has attacked some of these questions. However, future development activities must confront these questions in a much broader fashion. Unless this is done the number of "volunteers" will always be but a small percentage of the full potential.

One key factor in the development of a strengthened approach to participation must be an upgrading of the GIRM's extension services. Currently, technical assistance provided to local farmers and herders by the government is fragmented, originating from a series of directorates in the Ministry of Rural Development (agriculture, livestock, environmental protection). Due to budgetary constraints within each directorate, field agents are few and often without the means to perform their functions. Technical advice provided cannot serve the farmer or herder's need for an integrated approach to improving productive capacity, since each element of advice is provided by a separate service. The system is thus fiscally unviable and technically inadequate.

Proper cost-effective utilization of the results of such projects as the GIRD requires the establishment of a new form of extension in Mauritania which promotes the use of a polyvalent agent capable of dealing with the entire range of functions now provided by individual agents of each of the directorates of the Ministry of Rural Development. The implications of putting such a system into practice are great in terms of training and organizational requirements. Nonetheless, only such a revamped extension system will

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be capable of serving the development needs of the Guidimaka region and other rural areas of Mauritania in a cost-effective manner. Any further development work in the Guidimaka should be utilized as a trial ground for introducing and promoting such an extension approach.

Participation - The Case of Women

The need for a more dynamic, case specific, social analysis as a key to the proper development of project activities is demonstrated by the project's set-back in trying to initiate a series of activities specifically focussed on women. This is the one set-back where it appears legitimate to levy some criticism against the project team which has allowed an initial failure to justify reducing the proposed efforts in this field.

Technical assistance to women as a group through the project is important because: (1) given male outmigration in the Guidimaka, women and children (a totally neglected group) form the majority of the agricultural work force in the region; and (2) the project's efforts in this field represent its first trial in extending its activities to a specifically targetted group. Failure in this extension effort calls into question the project's ability to expand its activities to a significant number of participants without a more detailed extension strategy. It should be noted that the women's activities were not in the original project agreement but were a recent addition with the support of the project team. Partially on their initiative, over $100,000 was specifically budgeted for this purpose. There were apparently several initial

areas of interventions: 1) a survey was taken in which the task of grinding grain was revealed as a major time consumer. As a result the project purchased several grinding machines, but the women who had claimed they wanted the machines never bought them; 2) an attempt at working with rice production with the women of one villlage never came to be, apparently because the seed did not arrive on time; 3) a single woman pilot farmer was chosen to try some new cultural techniques but the test was incomplete because of her failure to fully follow directions, purportedly either because her husband told her not to or because the assistant who spoke the same language and had begun working with her was incapacitated by childbirth during the rainy season; and lastly, 4) there was formed, and continues to operate, a "cooperative" garden in Selibaby of about twenty women who basically pool funds to pay a man to take care of their garden.

Given these results, the project has apparently re-oriented its approach so that any women's activities will treat women as part and parcel of agriculturalists per se and not as a special category of agricultural producers with special problems. The rationale for this re-orientation involves the ideas that: (1) women are part of the greater family, (2) work with women must be directed through the male head of the family, and (3) women as members of the family will profit from what is taught to the men. Undoubtedly, women are part of the greater family and no intervention should threaten family unity. Support from male members of the family is also critical to success. However, development problems associated with women will not be resolved by a trickle down

approach involving men as the principal actor. Women have their own fields, their own crops and most importantly, their own distinctive economic and social as well as technical problems.

In other experiences, such as the War on Want Project among the Soninke along the Senegal River, women and children proved the most receptive to initial innovations in gardening. One possible explanation for this phenomenon is that women's fields are generally not used to produce basic food grains critical to consumption, so the women't willingness to take risks through adopting innovative techniques is greater. Other specific women-oriented activities have been developed among the Bambara women in Mali and Diola women in the Casamance area of Senegal. The two groups are not unsimilar to the Soninke both as to crops and socio-cultural patterns. By examining the results of any of these activities, worthwhile innovations and methodologies might be suggested which could be used to revitalize the GIRD focus on women as agricultural producers; again in terms of specifically targeted strategy responsive to the special condition of women as cultivaters.

Cultural Innovation and Project Interruptions

The project's accomplishment in gaining people's confidence unfortunately presents all the concerned parties with a new dimension regarding project continuation. Along with gaining people's confidence the project has created new expectations. A total cessation of activities at the end of project life could result in a new loss of confidence and dashed expectations that will be harder

to overcome a second time. For this reason further activities should be begun as soon as possible--if not for the entire scope of project activities--at least on a minimal level so that people sense that they have not now been deserted.

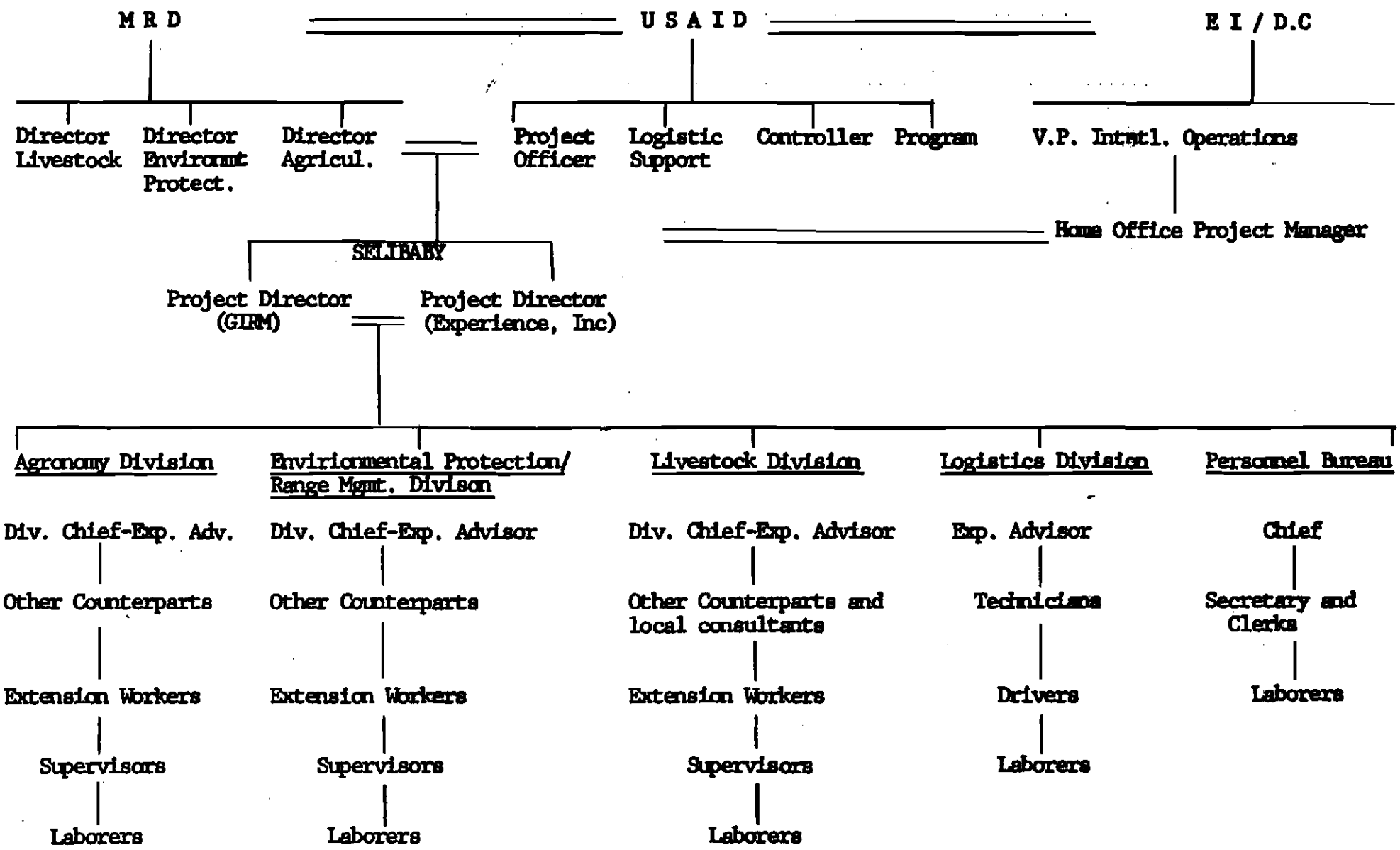
6. ADMINISTRATIVE AND FINANCIAL ANALYSES

a. Administration

A summary of the history of the development andexecution of the project is contained in Annex G. This material notes the substantial delays in initiating the project caused, primarily, by the lack of adequate implementation planning in the design stage: inadequate procurement planning, insufficient detailing of logistical requirements such as transportation, lack of satisfactory housing arrangements, etc. Reference is also made to the loss of considerable time on the part of all managers and technicians in dealing with the financial and managerial weaknesses of the first technical assistance contractor. These initial difficulties are further discussed in Annex G.

An organigram of the current administrative structure of the Guidimaka Project and its linkages to USAID and the GIRM is provided on the following page. The organization of the project in Selibaby parallels the functional structure of the Ministry of Rural Development with its divisions of agriculture, environmental protection and livestock. Each division of the project has on its staff individuals seconded from the related Mauritanian service. Working relationships are very close and productive between counterparts in Selibaby and between the contract team and its principal contacts in the Ministry of Rural Development in Nouakchott. Strong working ties also exist between the project team and the regional administration in Guidimaka.

ORGANIGRAM - GUIDIMAKA I.R.D.



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Operating relationships between the Experience, Inc. home office in Washington and the field team also appear to be strongly supportive of the project effort. The quality of these relationships could well serve as a model for other USAID project efforts within the Ministry of Rural Development.

There are several criticisms which are appropriate to the organizational structure and administrative system which is, in general, very effective.

The first problem is one of communications. The project has now had three different principal USAID project officers. Continuity has thus posed a problem. This situation has been partially responsible for the limited level of communication between USAID and the responsible counterparts in the Ministry of Rural Development regarding the substance of the Project. Another facet of this difficulty is the fact that the principal counterparts are also heads of major divisions in the Ministry with wide ranging responsibilities and limited time to focus on project-specific issues on a day-to-day basis. The lack of sufficient communication is reflected in many unilateral actions by USAID, particularly in regard to procurement and finance.

This lack of communication has led to misunderstanding regarding the implementation of the project. Presently, USAID is involved in the process of regularizing its communications with the

government through a system of periodic letters and quarterly reports on project activities. Preliminary plans indicate that a system of formal reviews involving all parties and including a summary of the financial position of USAID projects will be put into effect. This system, while not a substitute for day-to-day dialogue on project matters, will promote a higher degree of mutual understanding regarding project goals and implementation methods than has been the case in the past.

Project procurement has also been a regular source of difficulty beginning with the fact that a well-developed procurement plan was not included in the original PP. Much debate ensued on the level of involvement of the project contractor in procurement matters. The CDO wished to involve the contractor in procurement planning, but no provision was made to compensate the contractor for this service. Therefore, the contractor was reluctant to become involved in this aspect of the project. Eventually, practically all procurement functions were centralized in the Project Support Division of USAID. This in turn led to friction between the contract team and USAID regarding the processing of procurement requests, follow-up actions and the speed at which purchases were initiated. The PP Amendment called for a change in this system, vesting the responsibility for procurement of specific items of project equipment with the contractor. However, several of these items were still ordered by USAID since initial procurement actions by USAID were already underway.

Recent management analysis indicates that, given the current volume of project related commodity procurement, USAID itself cannot efficiently handle all local and off-shore procurement actions for each project. The decentralization of this function is a necessity, either through greater use of project contractors as procurement agents, the establishment of a service contractor to handle project procurement, or ideally, by placing the procurement function in the hands of the responsible agency of the host government.

It is now too late to make basic revisions in the procurement systems for the current Guidimaka Project. However procurements made by Experience, In. for this project should be carefully reviewed to determine what lessons from this arrangement can be applied to new USAID projects now coming onstream or in the planning stages.

Finally, the subject of institutionalization must be addressed. The project has succeeded in attracting a significant number of Mauritanian counterparts from the various services of the Ministry of Rural Development. Undoubtedly, service with the expatriate project technicians and other short-term training has enhanced the technical skills of these counterparts who will eventually be reintegrated into their respective services. Therefore, the Ministry of Rural Development, as an institution, will benefit from this improvement. Furthermore, training

supplied to laborers will benefit the region itself if these workers choose to remain in the Guidimaka once the project is completed

However, the project has in many ways become its own institution which is responsible for a large portion of the resources and manpower directed toward rural development in the area around Selibaby. The full staff of nearly 200 laborers, administrators and technicians is not sustainable by the GIRM alone, particularly given the agricultural extension needs of so many other areas of Mauritania. The recurrent cost burden for labor alone under the project approaches nearly $25,000 per month. As the GIRM seeks to further extend the results of the current project, it will necessarily adapt a much thinner administrative structure than exists under this project.

In summary, in order to achieve its designed purposes of improving agricultural and livestock production in the Guidimaka, in the limited time frame available, the project has found it necessary to utilize a level of manpower and resources for a comparatively small geographic area which cannot readily be supported throughout Mauritania by the national and regional governments. Future work along similar lines must seek methods of building on the technical results of the project, but within an administrative structure which is more closely related to the levels of manpower and resources which can ultimately be managed and supported by

Mauritania, itself.

b. Finance

AID Project Budget

Information on the AID budget for this project is presented on the following pages. A review of this material points out the lack of correlation between the final PP Amendment budget, the existing Pro-Ag budget and the project accounts maintained by USAID. These differences have many causes including the lack of various points in the life of the project of a detailed analysis of the level of past commitments and expenditures and lack of a detailed project budget. Without such a budget, posting of costs to existing budget categories became a sometimes arbitrary exercise, particularly in allocating costs between so-called "operational commodities" and the category for costs of commodities and services for the agro-sylvo pastoral project interventions (ASPPI).

It is therefore, not possible to state with certainty that the cumulative obligation totals shown on the USAID books for each category of expenditure are directly comparable to the estimated budget totals shown in the PP, the PP amendment and the Pro-Ag and its amendments. Given this caveat, it does appear that funds required for the direct support and operational support categories have exceeded original estimates by substantial amounts. Funds to support these increased expenditures have been drawn from other categories, including those for training, evaluation, and the category for agro-sylvo-pastoral interventions (ASPPI).

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GUIDIMAKA INTEGRATED RURAL DEVELOPMENT
BUDGET ANALYSIS

CATEGORY	PP. Amend Budget June,1981	Budg. Per Pro-Ag Am.6 Aug. 1981	Budg. Per Pro-Ag Am.7 Pending	Oblig. Per USAID Books as of 3/31/82	Commit. and Expenditures as of 3/31/82	Accruals Through 3/31/82	Projected Expendit. 4/82-12/82	Total Proj. Expendit. Life of Proj.
1. Contract	2,353	1,765	2,296	1,765	1,765	-	542	2,307
2. Direct Support	650	681	795	721	651	1	123	775
3. Operational Support	770	792	955	881	787	20	220	1,027
4. Other Pers. & Sup. Costs	265	139	164	125	120	2	27	149
5. Agro-Sylvo-Pastoral Projet Interventions	1,952	1,542	1,868	1,416	1,058	45	716*	1,819*
6. Training	79	40	43	50	9	-	34	43
7. Evaluation	82	30	30	31	1	-	30	31
TOTAL	6,151	4,989	6,151	4,989	4,391	68	1,692	6,151

* Budget for this category not well defined.
Figures derived by subtraction.

EXPLANATION OF AID BUDGET CATEGORIES

1. Contract: cost of contracts with U.S. commercial institutions to obtain technical services.

2. Direct Support
   a. Housing/office recurrent costs - rent, utilities, maintenance, watchmen.
   b. Housing renovation
   c. Commodities for housing - furnishings, appliances.

3. Operational Support
   a. Local office and workshop employees - salaries, benefits.
   b. Operational commodities - vehicles, garage equipment and tools, office furniture and equipment, communications equipment.
   c. Vehicle support - POL, insurance maintenance
   d. Miscellaneous - supplies and materials, misc. contract services, communications, local employee travel and per diem.

4. Other Personnel and Support Costs
   a. GIRM counterpart compensation
   b. Short-term consultants - other than those under the institutional contract

5. Agro-Sylvo-Pastoral Project Interventions (ASPPI)
   Cost of commodities and labor directly related to:
   a. Agriculture and Animal Traction
   b. Range Management and Environmental Protection
   c. Livestock

6. Training: cost of in-country and Third-country training for counterparts.

7. Evaluation: cost of mid-term and final evaluation.

Cd

Analysis indicates that the entire project is not underfunded. But the unanticipated high costs of such items as the development of satisfactory housing, vehicle maintenance, and fuel has meant a need to shift funds between line items to meet these costs. To date, such shifts have been made on an ad hoc basis without thorough consultation with the GIRM. Efforts are now underway to correct this situation by undertaking a detailed review of the project's financial status, of which the budget information presented here represents a part, so that information can be made available to all parties and a clear understanding reached on allocation of the remaining project resources. Any such review must take into consideration the requirement to further define budgetary needs under the ASPPI category, where the bulk of the project's remaining resources are currently located.

As noted earlier, several of the current budget categories draw somewhat artificial distinctions between expenditures which are in fact so closely related as to defy logical separation. In the future, it might prove worthwhile for those USAID projects with a series of easily distinguisable outputs, to reorganize the project accounting system so that a form of job-cost accounting is utilized which would relate costs to the functional activities of the project (livestock, agriculture, range management, in this case). Such a system would then eliminate arbitrary distinctions, since it would allocate all "operational"

costs to specific functional activities. The system would prove advantageous in developing inputs required for the cost side of a cost/benefit analysis.

It is not possible to reorganize budget categories for this particular project at this late date. What is imperative is to make clear as soon as possible to all parties (AID, USAID, and GIRM), what amounts have been spent or obligated, and how the remaining resources are to be used to attain project objectives.

. Host Country Project Budget

The GIRM budget for the Guidimaka Project consists primarily of costs for personnel involved either in the Selibaby area itself or at the national headquarters of the Ministry of Rural Development in Nouakchott. The remaining costs involve contributions made to the project by local residents of Selibaby and the surrounding DIZ, including labor, land and animals. The budget was increased by roughly 48 percent in 1981 following approval of the project paper amendment. This increase roughly parallels the percentage increase in time added to complete the project. The increase made in the AID budget at this time was roughly 85%. The following figures outline the budget for the Mauritania contribution as presented in the Project Paper and the subsequent amendment.

Host Country Budget (000'S U.S. dollars)

Category	Original Project Paper June, 1977	Project Paper Amendment June, 1981
Counterpart Salaries, Selibaby	579	960
Salaries Expenses - Directorate of Agriculture	92	157
Salaries, Expenses- Livestock Directorate	79	133
Salaries, Expenses - Environmental Protection Directorate	44	73
Salaries, Expenses, Min. of Rural Development	33	56
Local Labor	93	157
Animals	33	51
Land	50	83
Inflation	124	-
TOTAL	1,127	1,670

Once again, there is no direct link between these budgets, except for the final totals, and information contained in the Project Agreement and its amendments. Since the Pro-Ag budgets have been designed to reflect categories important in displaying AID costs, many of the components of the host country budget have been aggregated to suit this arrangement. There is no clear relationship between these aggregates and the details contained in the PP documentation.

Host Country Budget

(-000's U.S. dollars)

Category	Pro-Ag Amend No. 4 June, 1980	Pro-Ag Amend No. 5 June, 1981
1. Contract team	-	-
2. Direct support	-	-
3. Operational support	-	-
4. Local personnel costs and support	1,017*	1,540
5. Agro-Sylvo Pastoral Intervantions	60	80
6. Training	-	-
7. Evaluation	-	-
8. Land	50*	50
	1,127	1,670

The Government of Mauritania does not maintain an accounting system which provides information on costs incurred by the government or other local entities on a project by project basis. A non-quantitative review indicates that Mauritanians have been responsive in meeting their obligations to the project. Counterpart staffing is complete, all required land and animals have been made available by the local populations and much local labor has been donated particularly for the construction of a number of wells and school rooms. However, a precise

* These figures are shown as 1,077 and 59 in the actual Pro-Ag Amendment however, the total would then exceed 1,127. Comparison with previous amendments yielded the corrected figures.

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quantitative definition of this contribution is not available. It is recommended that, for future project activities, the GIRM establish an accounting mechanism which will allow a specific tabulation of costs incurred in meeting its obligations.

Local Cost Financing

Other than for those funds which are contributed by the host country government, all local cost financing of project activities is controlled directly by USAID and the technical assistance contractor. This system is not unique to the Guidimaka Project, but is utilized for many USAID projects on the basis of USAID's past analysis that the government ministries holding responsibility for project execution lack sufficient trained personnel and the accounting systems required to handle local currency funds directly.

As a result, for the Guidimaka project, a series of revolving funds exist of which the most important is based on a 5,000,000 ouguiya advance provided through USAID to Experience, Inc. The funds are initially deposited in a Nouakchott bank and are then utilized either in Nouakchott to purchase commodities or services from local vendors or by sending monies to Selibaby for use primarily in paying the salaries of local employees. Once a month, receipts for all purchases are aggregated, a voucher is prepared and submitted to USAID/Nouakchott which then arranges for the replenishment of the revolving fund.

Three other such funds exist, which are designed to operate as revolving funds for purchase and sale of basis project materials

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rather than operational commodities. The project paper amendment makes reference on page nine to these funds: $65,000 for animal traction equipment and accessories; $137,000 for veterinary medicine, livestock fee supplements, mineral blocks, disinfectant and other clinical supplies; and $15,000 for agricultural commodites such as small tools and seeds. Purchase of these materials is made on the basis of information from the project's field team supplied to either AID/Nouakchott or the Experience, Inc. headquarters in Washington, D.C. Sales to local participants are made on the basis of commodity cost discounted of transportation charges. As of this date, none of the three funds has been turned over. Therefore, the mechanics of converting local currency into the same sorts of goods as were initially ordered have not been tested.

The expatriate team management has worked to integrate Mauritanian counterparts into the control of procurement and sales associated with the revolving funds. Decisions regarding expenditures are also managed through joint consultations among expatriate and local staffs. However, given the current USAID mode of operation, responsibility for control and accounting of the revolving fund resources rests with the expatriate contract team. Such a system has been implemented given USAID's view that the GIRM lacks sufficient trained manpower and required fiscal monitoring systems to properly control project supplied funds. USAID is currently investigating the prospects of enhancing local currency management practices through such means as the Sahel

Regional Financial Management Project. Full advantage should be taken of this program and any other available oppotunities so that progress can be made toward full management and control of local currency resources by Mauritanians.

Recurrent Costs

As stated earlier in this section, labor costs to support current project activities amount to nearly $25,000 per month, most of which is currently absorbed under the AID component of project budget. The salaries of the eight Mauritanian counterparts working full time on the project are about $ 2,500 per month. Costs for expendables such as agricultural inputs, veterinary supplies, gasoline and vehicle spare parts vary from month to month and season to season and replacement needs for heavy equipment are even more difficult to predict. Nevertheless, it is estimated that all recurrent costs other than labor are, at a minimum, on the order of $ 25,000 per month. Total monthly recurrent costs are thus approximately $ 52,000, of which the much discussed indemnities element represents no more the $ 3,000.

Again, as previously noted, this level of expenditure for a relatively small region is unsupportable by the GIRM alone. Any future project activity must take this burdening factor into account. Activities must be designed in such a manner that, ultimately, interventions can be replicated by the GIRM or other Mauritanian entities is a cost-effective manner.

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7. RECOMMENDATIONS

a. Current Project

* Review the current budget to determine if funds are available to direct a higher level of resources toward additional technical training for extension personnel and the acquistion of materials and aids for use in the extension program. This budgetary review will also determine whether sufficient funds exist to continue the development of the extension program and worthwhile aspects of the applied research program beyond the current project completion date of December 31, 1982.

* Review training needs in financial and administrative management with a view toward enhancing counterpart capabilities to manage rural devèlopment programs.

* Investigate the feasibility of further institutionalizing Mauritanian management, financing and control of such project activities as:
  - operation of animal traction centers
  - provision of credit for agricultural implements and supplies
  - sale of veterinary drugs and supplies
  - continued development and utilization of the tree/vegetable nursery

This theme of the prospects, constraints and support required to promote institutionalization should be highlighted in the project's final report.

* Financial resources and additional time should be afforded to the team sociologist to prepare a comprehensive report on (1) the social dynamics of the project area, (2) the relationship of those dynamics to the development process and (3) recommendations regarding a strategy for extending positive project results throughout the Guidimaka region.

* Upgrade the project's record keeping and reporting regarding the cost, use of materials and results obtained from agricultural trials and other experimental activities so that the extendability of such actions as the following can be adequately judged:
  - Utilization of animal traction for cultivation;
  - Use of sorghum stalks for animal feed; use of other feed supplements
  - Introduction of new forage species
  - Use of mechanized equipment to construct catchment basins
* Revitalize, in so far as possible, the activities focussed on women with a view towards meeting their particular extension needs in the field of agricultural production.
* Eliminate any agricultural trial work which has

already shown existing practices to be efficacious (intercropping, spacing for certain crops, etc.)

* Emphasize those trials and demonstrations concerned with water conservation techniques such as the cross slope ridge method.
* Continue the small project program, utilizing additional resources from the project budget if necessary as agreed by USAID and the GIRM, to develop additional projects either within or outside of the DIZ as mutually agreed upon by the project management and the regional authorities. Projects should be concentratedon those activities which will directly contribute to enhance food production, of which the well-building activity is a good example.
* Utilize equipment available to the project to assist in building firebreaks as time and resources permit. Report on the efficacy of any existing firebreaks (built for the purpose or otherwise) in stopping or retarding any fires which occur this season.
* Strengthen current level of dialogue concerning the project between USAID and the GIRM by emphasizing regular reporting, to include the status of procurement and the financial standing of the project.
* Assist GIRM in developing capability to account for specific host-country contributions to this project and other USAID projects as well.

b. Future Options

The current Guidimaka I.R.D. project will complete its activities at the end of this calendar year, unless, as suggested in the preceding section, budgetary review reveals resources which may be used to continue selected activities for several additional months. Beyond that point, three basic alternatives are available regarding the use of the knowledge base, infrastructure and trained cadre which have been developed by the project: 1) halt all actions as of the end of the year; 2) continue in the same basic mode of operation but on a larger geographic scale; and 3) develop an alternative framework that extends to as many individuals as possible the most promising development innovations of the current effort and continues to search for more effective means of increasing agricultural and animal productivity.

All evaluators are agreed that a total halt to all efforts in the Guidimaka region begun by this project would be extremely disadvantageous from an economic as well as a social perspective. While the current project has proved uneconomic due to the heavy costs incurred in its execution, selected aspects of its activity could have strong positive returns if a cost-effective form of extension can be adopted.

A future effort utilizing the current mode of operation will not provide a satisfactory solution. Means must be found to reach a much greater population with the results of adaptive research

at a much lower cost. Arriving at a definitive administrative and technical solution to this problem is beyond the scope of this paper. However, the following observations and recommendations are made as a basis for structuring further inquiry.

* Technical Activities

All evaluators are agreed that the agronomic research and demonstration aspects of the project are its strongest components and have produced the most positive results. Several new varieties of sorghum, millet and cowpeas have already proven themselves as prime candidates for future extension efforts on a wider scale. The infrastructure is now in place to continue dryland cereals research. Further technical assistance in this field will be required.

The animal health and feeding aspects of the program show great potential, but have not had sufficient time to be developed. Means should be found to firmly institutionalize the sale of drugs within the Animal Health Service, as will be discussed in the next section. Further testing and extension efforts on supplemental feeding is recommended. Reinforcement and expansion of the naiscent program of village veterinary pharmacies must depend on the analysis of the initial efforts made by the current project.

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Interventions involving range management are not likely to be effective without a stronger national policy on acess to and control of grazing lands. In the absence of such a policy, the potential for significant improvement in this field is limited. The current experiments regarding establishing small forage reserves at the village level should be followed closely to note results. However, large-scale extension of range management concepts must await associated improvements in the current legal framework. Research has located several new tree varieties which may have potential for development in the region. The project nursery also has the capacity to produce large numbers of well-known species such as the neem and various acacias. However, public interest in this activity is not strong, probably due to the long-term nature of the results. If an effective extension method can be developed to support the forestry component, then further efforts can be justified.

The small infrastructural projects aspect of the overall effort has produced laudable results,particularly in regard to developing water sources in this very water-short region. Water availability is obviously a critical element in health and sanitation, mitigating the potential for outmigration, and bolstering such activities as vegetable gardening, etc. In fact, thought should be given to the concept of analyzing water requirements in a systematic fashion and organizing the infrastructural component of any subsequent activity around meeting those needs through the installation of wells, small dam structures, catchment basins or the like.

* Implementation Modalities

For any future effort, to coin a phrase--more must be done with less. The infrastructural base developed by the present project-offices, demonstration sites, etc.-- must be utilized to produce results to be extended throughout the Guidimaka region. Indeed, means must be found to make applicable information available to the widest possible audience through the services of such institutions as CNRADA, ENFVA, and the staffs of the regional sector chiefs of the various sections of the Ministry of Rural Development.

This last point alludes to another theme of this report, that the Mauritanianization of project activities be continued. At some time in the future, the project itself as an institution must disappear. What should remain are a strengthened capacity within the government and the region to meet development needs and a more informed, economically strengthened rural population.

To achieve this end, control of local currency aspects of project activities must eventually be shifted to Mauritanian hands. The current efforts on the part of the expatriate project team to integrate their Mauritanian counterparts into the management of the project must be bolstered and fully supported by USAID. This aspect implies training, which is a very weak element in the current project. Means must be sought, not only to improve skills in research and extension

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work, but also in financial and administrative management. The form of the future extension effort must be addressed in the design of any follow-on activities. All evaluators note the need for a polyvalent extension agent who can promote and demonstrate improved techniques in all principal fields of rural development. Currently such agents do not exist in Mauritania. Rather, the divisional system within the Ministry promotes the fielding of agents to deal only with agriculture, or only with livestock or only with environmental protection. This division is reflected in the organization of the National Agricultural School (ENFVA) at Kaedi which produces nearly all the extension agents for the country. The division is also reflected in the current organization of the project itself. The current system is both costly and unwieldly administratively. An assessment must be made of the feasibility of altering the framework for extension in Mauritania. Perhaps, the Guidimaka region could be used as a test ground for promoting the development of a new system utilizing a polyvalent approach. A strong technical assistance effort and training program would be needed to support such an approach.

Finally, any new effort must include a rural credit system firmly institutionalized within the Mauritanian administrative milieu. Credit is needed to support the development of infrastructure, promote the use of animal traction, to buy seeds, tools and other commodities. Without it, the economic growth of the region will remain stunted. Development of a credit system must be promoted and the means for doing so investigated.

*Modalities of Financing

Current financial constraints preclude USAID from continuing the level of direct support which has been provided through the project in the past. However, there are a number of pessibilities which, when taken together, may produce a stronger financial package for development in the Guidimaka region than the previous financing concept. USAID is in the process of planning for the development of an Agriculture Sector Grant project which will be designed, in part, to fund promising agro-sylvo-pastoral interventions developed by existing USAID activities. This broad-based project concept could be utilized to finance a wide range of the present activities under development by GIRD: cereals research, livestock feeding, forestry, extension, rural credit. Development of the grant concept is to be preceded by an agricultural sector assessment to be conducted during the summer and autumn months of this year. This assessment is designed to provide the analytical basis for the development of future food-related programs by USAID. Material from this evaluation and the reports and analyses produced by the GIRD project will be made available to the team conducting the assessment on their arrival in Mauritania.

Another potential source of funding for activities in the Guidimaka is the USAID Food for Peace (P.L. 480), Title II, Section 206 program. One aspect of this program is the generation of local currency from the sale of food grains

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donated by the United States with the local currency to be utilized to support the development of grain production in Mauritania. A portion of the local currency requirements to continue dryland cereals research and extension efforts in Guidimaka might be underwritten by this project. The project might also have a role to play in supporting rural credit targetted toward cereal production or the development of grain storage technology in Guidimaka.

Among other AID-financed actions which will play a role in the development of the Guidimaka region are the large OMVS activities planned for the Senegal River Basin. These activities, are important to consider in the context of development in the Guidimaka because of the considerable financial and human resources which they are expected to command. Planning for the OMVS Integrated Development Project (IDP) includes the possibility of developing a number of animal traction training centers along the river, including two in the area of Bakel, Senegal which fronts directly on the Guidimaka border. First of all, the design of the IDP project should take into consideration the experience of the GIRD project in the animal traction field. Secondly, the location and function of these centers should be designed to promote the widest use by as many individuals as possible in the regions bordering the riverine area.

Another facet of the OMVS program is the Agricultural Research II project which will be cooperating with the National Research Center (CNRADA) based at Kaedi. While the principal focus

of the OMVS program is on irrigated agriculture, there may be the potential for directing a portion of this project's activities toward dryland cereals research. If this approach were to be followed, then there would exist a natural basis for collaboration between OMVS project and the cereals research efforts in the Guidimaka. In any case, a strong linkage between the CNRADA program and dryland cereals research in the Guidimaka is important for promoting a mutual exchange of valuable information and the widest possible dissemination of results. Technical and financial linkages with other donors must be considered as well. The FAC has brought animal traction equipment into the Guidimaka for sale to farmers. A potential collaborative role with the current or future animal traction training centers would be worthy of investigation. The FED is planning work on reforestation involving gum arabic trees on a large scale in the Trarza, Gorgol and Guidimaka regions. Collaborative efforts with the nursery established by the GIRD at Selibaby should be investigated. Further work in livestock feeding experiments and demonstration, as well as any work on range management which is found worthy of pursuit, could be incorporated within the framework of the World Bank's proposed Southwest Mauritanian Livestock Development Project.

Such coordination and exchange of information between donors implies a much more intense level of dialogue between donors than has been the case in the past. Above all,the need to share information at the donor level is imperative so that time and precious resources are not wasted on parallel efforts or

inquiries being pursued simultaneously by several organizations. One possible means of promoting such information sharing and co-ordination would be the creation of development coordinating committee for the Guidimaka region under the auspices of the Ministry of Rural Development. On a periodic basis, perhaps once a quarter, representatives of the parties interested in the development of the region (the Ministry, the World Bank, FAC, FED, OMVS, USAID , representatives from the regional administration could meet to review the status of development activities in the region and to exchange technical information. Such an approach may prove valuable in fostering a truly integrated development program for the Guidimaka region.

ANNEX A

GUIDIMAKA INTEGRATED RURAL DEVELOPMENT
PROJECT (682-0201)

AGRONOMIST'S EVALUATION

Dr. Roy Bronson, REDSO/WA.

Introduction

This evaluation took place during the period of February 1-12, 1982. It is based on review of project documents, contractor reports, and on observations made during a four-day field visit to the project site at Selibaby in the Guidimaka (Tenth) Region of southeastern Mauritania. This visit fell during the dry season and therefore none of the principal food cereals and grain legumes of the area were actively growing. These crops are: sorghum, millet, maize, cowpeas and peanuts. Therefore, none of the crop variety experiments or the village demonstrations of improved varieties and cultural methods could be observed directly. The primary observable activities were: 1) irrigated garden experimentation at the Selibaby Center and garden production at the village level, and 2) animal traction use for water lifting. These observations were supplemented by extensive discussions with project technical staff and meetings with pilot farmers, cooperative members and other extension agents and villagers.

General Observations

A capsul review of project history is provided in the January 15, 1982 Preliminary Progress Report by the Project Chief of Party. Suffice it to say that the contract team reached at full strength in October, 1981 with the arrival of the animal husbandry specialist. The current agronomist has been on board a full year.

Team morale is very good and cooperation appears to be excellent. The level of individual professional capability and ability to adapt it to local problems and conditions is very good. Functional French language capability is exceptional for individual members and for the team as a whole, and it shows in working relationships at all levels. Further, the team has a practical orientation coupled with a desire to help the local people who are predominantly rural.

Agronomic Programs

The contract agronomist and his two Mauritanian counterparts have together organized and executed an impressive program

of experimentation, testing, demonstration and training in the agronomic segments of the project activities. These are, mainly: 1) cereal and grain legume food crop variety tests, 2) demonstrations of soil management practices, 3) introduction of animal traction for crop culture, 4) irrigated vegetable garden production, 5) improved cultivation and cultural practice techniques, and 6) on-farm trials (village demonstrations).

The program has a well-rounded approach which begins with statistically designed experiments and moves promising varieties and techniques rapidly but assuredly into pilot farmer participation tests, taking into consideration the differences in local soil and topographic situations through testing at three different locations in the Direct Intervention Zone (DIZ).

EXPERIMENTAL SITES

Selection of the three agronomic experimental sites is appropriate to the major soil types used for cereal and food legume crops. Each has its particular management problems and crop adaptability. The Katamangue' site has heavy clay soils (vertic) which shrink when dry and swell when wet. Potentially the highest producers, these soils are difficult to manage when either dry or wet. The Singha site has the sandiest soil which is deficient in organic matter and low in water-holding capacity. The Niarouwalle' site is a depleted sandy clay loam of low productivity due to continued cropping and grazing. Initial land preparation and tillage trials have already shown that certain practices are better adapted to certain sites.

CROP VARIETY TRIALS

With respect to the performance trials of both local and introduced varieties of crops, the agronomy team has done impressive work in getting seed from African regional organizations, e.g., SAFGRAD, the international agricultural research center units in Africa (ICRISAT/Mali, ICRISAT/Upper Volta, IITA/Upper Volta and Nigeria) and three U.S. universities (Texas A & M, Kansas State, Purdue) which have worldwide crop research programs. Early results indicate promise of substantially increased yields along with improved resistance to lodging and to pests, as well as to drought.

It should be noted here that these results are based only on the 1981 growing season. In 1979, no contract agronomist was on board and in 1980, rainfall distribution prevented experimentally valid yields. Therefore, caution should be exercised in interpreting these results. However, the yield and performance differences observed are of such magnitude, that some of them could be moved into on-farm tests and demonstrations with considerable confidence. Also, 1981 data are being

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analyzed statistically so that significance of the yield difference can be determined and that they can be used as the aggregate analysis of future data.

SORGHUM. Twenty-nine varieties (including local variety check).

a) ICRISAT/Upper Volta. Of 20 varieties in test, 10 yielded in the 2-4 MT/ha range compared to no yield for the check (moisture limitation).

b) SAFGRAD. Of 9 varieties, 5 yielded in the 1.8 - 2.8 MT/ha range compared to 1.1-1.9 for the check.

MAIZE. IITA/Upper Volta. No variety yielded better than the local variety check at 2.0 MT/ha (due to moisture deficiency).

NIEBE. IITA/Upper Volta. Of 19 varieties, 14 yielded over 1.0 MT/ha compared to 0.5 MT/ha for the local check.

MILLET. Kansas State and ICRISAT/Mali. No yields were obtained on 9 varieties due to very poor germination. Will be repeated in 1982 with new seed.

STRIGA-RESISTANT SORGHUM. SAFGRAD/Upper Volta. Of 21 varieties, 9 yielded over 1.0 MT/ha compared to 0.4 MT/ha for the local check variety.

The higher yielding varieties, plus peanut and rainfed rice varieties will go into second year yield trials in the 1982 crop season at the Katamangue' and Singha sites and on some farmer's field sites.

CULTURAL TECHNIQUES, INCLUDING SOIL MANAGEMENT

Early (pre-rain) scarification of the surface of the soil to increase moisture absorption (infiltration) at Katamangue' indicated that the hard, dry soil could not be effectively scarified and that the deep and contiguous network of cracks characteristic of vertisols probably had greater influence on infiltration than the pre-rain harrowing.

Sorghum and Millet spacing trials confirmed that the spacings currently in use by local farmers (100 cm between rows and 30-50 cm within the row) gave the highest yields. There was little effect of spacing on peanut yields within

the rows.

Intercropping of sorghum with niebe (cowpea) gave low sorghum yields (260-430 kg/ha), lower in fact, than the traditional method of sowing the sorghum and cowpea together.

IMPROVED CULTURAL TECHNIQUES DEMONSTRATIONS (ON-FARM TRIALS)

These demonstrations of improved crop cultural methods were carried out in conjunction with the five village animal traction and agricultural extension centers at Selibaby, Diala, Coumba, Danguerimou and Soufi. The demonstration fields were plowed with animal traction and improved techniques (seed treatment, spacing, early thinning, early and continued weeding (hoe), hilling up, etc.) were used. These were compared to traditional preparation (no plowing) and culture. Demonstration yields varied from 29-90% greater than traditional.

IRRIGATED VEGETABLE GARDENS

Ten to fifteen project-affilitated vegetable gardens were visited in the DIZ, as well as several adjacent private (non-affiliated) gardens. The farmers received improved varieties of tomatoes, cabbage, eggplant, kohl-rabi, carrot, turnip, beet as seed or as transplants from the nursery at the Selibaby Center. They were also instructed in preparation of beds for seedling, manuring, planting techniques, and continuing care of the plants. Two such larger gardens were operated by cooperatives, one a women's cooperative. The supervised gardens were well maintained and watered. Each garden had close access to a dug well and was enclosed by a fence. These gardens and the project help in getting them established is highly appreciated as evidenced by commentary in village meetings. The produce from them meets a family dietary need at less than market cost, and the surplus can often be sold in the local markets for cash. This is obviously a successful program and is a potential vehicle for other extension efforts.

ANIMAL TRACTION

The only use of bovine traction seen was the water-lifting from wells by yokes of oxen at the Selibaby Center and the Katamangue' site. However, the expressed appreciation and value of traction animals, especially oxen, was widely heard, most especially the assistance of the Animal Traction Centers

in training animals brought to the centers by farmers. By local account, the use of traction tools, long unused, has increased now that the farmers have been shown how to adjust them, and that trained traction animals are becoming common in the area. Six animal traction and agricultural extension centers will be in operation for the 1982 crop season, each with an extension agent, a senior animal trainer and a junior trainer.

PROGRESS-TOWARD PROJECT OBJECTIVES

With almost a calendar year and a full crop season yet to run, it is the judgment of the agronomist that this project has made impressive progress, especially in the past year. This in spite of the delayed and difficult start-up period. The project now has in place a functional physical plant, an energetic and exceptionally capable and cohesive team and a well designed and organized program. It has also achieved a high level of understanding and acceptance of its activities and programs. It enjoys cordial and functional relationship with local people and their government officials. It already has enough experience with varieties and with certain cultural improvements to provide the basis for broader extension efforts. The continuity of this effort should be preserved if there is any way possible to do it.

The agronomic items in the revised logframe outputs column are shown below with an estimate of progress toward completion. Some of the outputs have already been developed and certain others can readily be in the remaining months of the project.

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REVISED LOG FRAME OUTPUTS/INPUTS

PP Amendment - Log Frame Revision

Outputs:

1) Demonstration sites established; improved agronomic, livestock management, range management, and vegetable/fruit production practices tested. - On target

2) Farmer participants trained in new technologies and techniques. - Partial

3) Nursery for tree seedlings established and tree planting requirements carried out. - Short-fall in tree planting

4) Small infrastructure projects carried out. - On target

5) Competent animal health services established. - N/A

6) GIRM personnel trained in livestock, agronomy, extension methods, animal health and environmental protection. - On target

Magnitude of Outputs:

1) Demonstration sites established: 3 6-8 ha sites (agronmic), 1 400 ha livestock demonstration unit.- Katamangue', Singha and Niarouwalle' sites functional.

2) 150 farmer participants thoroughly trained.- PARTIAL. 15 pilot farmers 155 contacts.

3) 100,000 trees planted.- ESTIMATE 20,000 to be planted in 1982.

4) 20 small infrastructure projects (completed or in progress) - 10 complete, 11 in progress.

5) Functioning GIRM livestock service in 10th Region. - N/A

6) 27 extension workers trained.- OK,see pp. 23-24 of Preliminary Report dated January 15, 1982.

Inputs:

U.S. -- Technical assistance, commodities, vehicles, training

GIRM -- Personnel, land, livestock

Implementation Target:

1) 276 pm of L-T advisory services, 5 pm of TDY services

2) 9 Landrovers, two 7-ton trucks, 1 tractor, 1 bulldozer, 20 motorcycles.

3) Other equipment supplies and construction.

GIRM:

1) 7-16 livestock, ag extension, and environmental protection agents.

2) 500 + ha of range/crop land

3) 50 cattle; 100 small ruminants

RECOMMENDATIONS AND PROBLEMS

Varietal testing. This program should be continued for at least three more years in order to 1) develop the statistically reliable confidence in the performance of improved varieties, 2) to give them longer exposure to the conditions in which they are grown (diseases, pests, weather, etc.) and 3) to allow for continuing testing of new varieties as they become available from international and local sources.

Cultural methods and soil management. This program should be developed into a continuing development and feed-back system which is institutionalized within the Mauritanian agricultural services system. It will be absolutely essential to the expansion and longevity of a functional area extension agency.

Water use and management. More specific attention should be paid to this problem. The beginnings made within the improved cultural practice trials, with cross-slope ridge culture for enhanced rainfall infiltration into the soil should be developed into a concentrated effort to maximize the capture, storage, use and conservation of available water using simple to more sophisticated methods and structures, as the economics of the system permit.

Insects and pests. Beetles, weevils, grasshoppers and other insects are a sufficient problem that professional assistance is needed. Whether through a series of advisory visits or by a full-time technician.

ANNEX B

- MISSION REPORT - Mr. CARRE -

GUIDIMAKA, I.R.D. PROJECT

(Original text in French)

I - MISSION OBJECTIVE

To participate to G.I.R.D Project evaluation.

II - PARTICIPANTS-PROGRAM

See annex 1

III - G.I.R.D Project means

1° - Project general activities

In its first phase, the Project objectives were to test and refine technically feasible innovations, economically profitable and socially acceptable to the peasants, augmenting production and stabilising populations and at same time conserving and improving the environment.

A second later phase was then to popularize the proven techniques.

The Project, which started in April 1979, at first experienced numerous difficulties, particularly with the American contracting firm, implementation of the trials was delayed.
Furthermore, very soon a need was felt to popularize proven cultural techniques, something not initially foreseen in the Project's first phase.

Meanwhile, to this date, Mauritanian and expatriate personnel are in the field, equipment is in place and available, infrastructures (offices, buildings, experimental sites, fire breaks, nurseries, gardens, walls, etc...) are functionnal and research and popularization actions have started.

The Project is known and its action appreciated in the D.I.Z (Direct Intervention Zone) villages.

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2° - Agricultural Division (AG/DIV) activities resume

- Trials conducted on :

Variety trials of millet, maize, sorghum, niebe from either local varieties or imported ones (provided by ICRISAT, SAFGRAD, USDA). Millet trials haven't yielded exploitable results in 1981-82. The best sorghum, maize and niebe varieties will be tested again next rainy-season.

Cultivation technique trials on plowing, spacing, crop association, soil fertilization, and crop rotation.

Truck farming trials, to determine the varieties and cultivation techniques best adapted.

- Seed production

About 800 kgs of souna III seeds, 1600 kgs of sidi nieliba (a short cycle local sorghum variety) and 500 kgs of E-35-1 (a long-cycle imported sorghum variety) were harvested.

- Extension concentrates on 4 main areas.

. Development of traction cultivation with equipment sales (for credit possibilities animal training and demonstration of use, adjustment and maintenance of this equipment. See sale conditions annex 6

. Seed distribution of high yield varieties of sorghum and millet (see above) well suited to Guidimaka conditions. For the 1981-82 rainy season, about 120 peasants of the DIZ villages having an extension center received souna III seeds (500 kgs) and sidi nieliba (300 kgs). Unfortunately, it was not possible to know the production of the plots or the stocking conditions after harvest or eventual use.

. Extension of improved cultivation techniques. The Project created five animal traction and extension centers in five D.I.Z villages, each center being staffed by an animator an animal trainer and his assistant. Each center also has a pair of oxen, one or two plows and a bovine cart. Extension bears principally

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on the following cultivation techniques : seed treatment, plowing, seed holes density (100 cm x 40-50 cm), early thinning, early and continuous weeding, earthing up. Each center relies on pilot peasants (16 at this time) who cultivate demonstration plots whose yields are then compared to traditionnally cultivated plots. This year, there was an average 50 % production increase in fields cultivated with improved techniques.
About 175 other peasants have been "touched" meaning they used at least one of the recommended improved techniques.

- Truck farming development through the supply of seedlings and seeds from the truck farming garden and by the extension of truck farming cultivation techniques.

- Support actions

They mainly concern the training of supervisory staff and extension agents, the organisation of villagers meetings and visits on the sites by the villagers, the cooperation with other services and assistance to the AG/sector.

3° - Summary of the animal husbandry division activities

- Animal health action with a follow-up of the Katamanghé and D.I.Z herds, and interventions if necessary (consultations, sampling, epidemics...).
- sale of the most common drugs upon prescription by the animal husbandry services. Since May 1981, the sale output amounts to about 430.000 UM.
- Establishment (in progress) of village pharmacies.
- Training of twelve volunteer villagers for animal health actions.
- Extension agents training.
- Assistance to the animal husbandry service.
- Cooperation with other services...

4° - Summary of the Nature Protection - Range management - Division activities

- In collaboration with the animal husbandry division stocking of Katamanghe site.

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- Stocking rate trials on ranges tied to feed supplement trials, which will render interpretation quite delicate.
- Haymaking and silage trials.
- Adaptation trials of local and imported leguminous plants.
- Extension of harvest and stocking of sorghum thatch.
- Construction of three catchment basins, one of which is being cemented.
- Establishment of a tree nursery, selection, production of seedlings and seeds.
- Reforestation of Project sites and sale (5 UM) of trees (shade) in the villages ; planted on the sites with a survival rate of over 50 %.
- Construction of fire breaks around sites.
- Training of extension agents.
- Assistance to the Nature Protection service and cooperation with other services.

5° - Small projects of village infrastructure

These little projects permit improvement in the quality of life in the villages and thus assist in maintaining the populations in their region. Each project is financed up to 25 % of the overall cost or up to a maximum of 50.000 UM by the G.I.R.B, most of time under the form of imported materials, the village providing labor and local materials. Seven classrooms, five wells and a vaccination corral are ready and in use ; eight classrooms, six wells and a dispensary are in the process of being built.

V - REMARKS

Despite often difficult intervention conditions the Project was able to conduct a double action of research and extension, and to be appreciated by the villagers of the D.I.Z.

This very positive action for the whole of rural development within the D.I.Z still makes one regret :

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- The lack of documents, analysing and synthesizing the actions and results with numerical data.

- The extension activities placed upon structures best adapted for research. The result is a lack of organisation and efficiency in the extension : specialisation of extension agents lacking methodology in interventions and precise objectives, without technical files at their disposal, lacking in training and supervision.

- Lack of coordination with other extension or research organisations.

- Lack of follow-up of peasants having received selected seeds.

- Little if any participation (generaly) of peasants in the training of their own animals.

- The almost non existence of a zootechnical program in the animal husbandry division.

VI - RECOMMANDATIONS

Taking into account all the accomplished activities and the few remarks above, it seems useful, in order to increase the Project efficiency, to give the following recommandations :

1° - Short term (March-December 1982)

- General recommandation

  Collection and exploitation of date concerning agriculture and animal husbandry. This collection which should constitute one of the main current activities of the senior staff, should at a strict minimum :

  . be done in all villages having an extension center

  . characterise the media in which the project is executed in order to be aware of the essential elements : human resources put into play for production (definition, amount and description of the production units, etc...), description of the production systems, technological level of the peasants.

  . Wider cooperation with the other extension or research organisations.

  . Elaboration at the end of the Project of a general document analysing and synthesizing (with commentary and diagrams),

- observations, actions and results of all the divisions.

- Agronomy division particular recommendations

  . Defining action programs and objectives for each extension agent.

  . Elaboration of technical indexes on two levels for the extended topics : on the one hand for the permanent training of the agent on the other hand for use in the extension.

  . Intensification of the extension agents follow-up and control and establishment of a permanent education (including an education on the technical elements of production).

  . Abandon certain trials on cultivation techniques whose efficiency need no longer be proven (plowing, organic composting).

  . Better follow-up of peasants having received recommended varieties of seeds, in order to know the plots output, control stocking conditions and production use.

  . Necessity of greater peasants participation in the training of their animals, on the one hand, to transfer this competence to the peasants level, on the other hand, to increase the numbers of trained team/trainers + trainer-helpers.

2° - Medium term

- Necessity to fund the project's second phase, which should include: a "demonstrative trials" activity on sites to invalidate or confirm the research centers results.

- An extension of cultivation techniques and animal husbandry (and not only animal health) activity to the whole of the Guidimaka.

- A "small project" activity for a certain number of villages.

- A local artisan training activity.

- Establishment of a training-extension division for permanent training and the supervision of polyvalent extension agents with good knowledge of the surroundings in which they will have to intervene (including gathering of technico-economic informations) and in charge of the agro-sylvo-pastoral techniques extension.

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- Writing of a complete yearly report, detailled and numbered analyzing observations, actions and results.
- Systematical yearly visit from a follow-up and evaluation team.

VII - CONCLUSIONS

In three years of existence and two cultivation seasons, GIRD Project performed multiple actions in the field of research and extension ; it also was able to introduce itself into a closed rural surrounding and earn the confidence of many a peasant, which wasn't the easiest.

The terrain is now ready for a development effort of wider scope, and it is necessary that a second phase be funded ; an intervention to transform a traditionnal rural environment such as the Guidimaka is a long and exacting labour which calls for long years of follow-up if one doesn't want everything accomplished up to now by the project to go down the drain.

ANNEX 1

PARTICIPANTS SCHEDULE

I - PARTICIPANTS

1° - R.D.M

MM. LAM Hamady - Director of Agriculture
Mohamed Bah O/Sidya, Director of Animal husbandry
Kane Hadya, Director of Nature Protection
Abdallah El Feki, Advisor to the Minister
Flon, Advisor animal husbandry directorate
Carré, Advisor agriculture directorate

2° - U.S.A.I.D

MM. Mac Donald
Carr
Grayzel
Griego

3° - G.I.R.D

All the technical senior staff of the Project

II - SCHEDULE

Wednesday 17

General introduction

- Presentation of the agriculture division activities
- Presentation of the EM/NP division activities

Thursday 18

- Visit to the nursery
- Visit to two experimental sites, Singha and Niarousalle
- Presentation of the activities of the animal husbandry division
- Presentation of the "small projects for village infrastructure"
- Presentation of the sociology division.

Friday 19

- Visit to the experimental site of Katamanghe
- Visit to 5 of the DIZ villages : MBekere, Diegui, Diala, Kininkoumou, Dangnerimou.

Saturday 20

- Visit to 2 DIZ villages : Koumba N'Dao, Bourroudji - Meeting with pilot peasants.

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Sunday 21

- Final meeting

Monday 22

- Meeting with the technical staff of the agronomy division

Tuesday 23

- Visit to Koumba N'Dao (village in the DIZ) which has an animal training and extension center, meeting with peasants
- Discussion and research of information with the agronomy division staff.

Wednesday 24

- Meeting with the Selibaby Ag/sector chief
- Meeting with the Ag/Div staff.

G.I.R.D PROJECT STAFF

AS OF FEBRUARY 20/1982

TECHNICAL STAFF

- 1 Mauritanian chief of party	Engineer
- 1 Expatriate chief of party	P H D

AGRONOMY DIVISION

- 1 Division chief	Monitor
- 1 Technician	Conductor
- 8 Extension agents	
- 7 Animal trainers	
- 7 Trainer helpers	
- 1 Expatriate	

R.M/MP DIVISION

- 1 Division chief	Conductor
- 2 Technicians	1 Monitor + 1 Conductor
- 4 Extension agents	
- 1 Expatriate	

ANIMAL HUSBANDRY DIVISION

- 1 Division chief	Engineer
- 1 Technician	Animal husbandry assistant
- 5 Extension agents	
- 1 Expatriate	Dr. of Veterinary medicine

LOGISTICS DIVISION

Implementation personnel

Office staff

- 1 Administrative assistant
- 1 Secretary
- 1 Runner
- 1 Clerk

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Garage staff

- 1 Mechanic
- 1 Shop-keeper
- 8 Drivers
- 1 Bulldozer driver
- 1 Driver assistant
- 1 Electrician assistant

Logistics division staff

- 1 Foreman
- 3 Masons
- 1 Assistant driver
- 6 Laborers

Nursery laborers

- AG/DIV	5
- RM/NP	10
Total	15

Laborers and shepherds on sites

- AG/DIV	26
- RM/NP/DIV	48
- A.H/DIV	4
- Shepherds	16
Total	94

Watchmen

- the sites	6
- houses	12
- offices	2
- nursery	2
Total	22

G.I.R.D PROJECT, STAFF REMUNERATION

Labourers	3.715 UM/Month	
Assistant driver	3.715 UM/Month	
Runner	3.715 UM/Month	
House watchman	3.803 UM/Month	(Nov. = 4.275 UM)
Assistant mason	4.000 UM/Month	
Animal trainer assistant	4.072 UM/Month	
Animal trainer	4.715 UM/Month	
Foreman	4.715 UM/Month	
Painter	4.715 UM/Month	
Shepherd	5.000 UM/Month	
Extension agent	6.000 UM/Month	(Nov. = 6.072 UM)
Clerk	6.072 UM/Month	
Warehousemen	6.502 UM/Month	(+ 3.000 UM/Month bonus)
Electrician assistant	6.600 UM/Month	(+ 3.000 UM/Month bonus)
Driver	6.905 UM/Month	(+ 1.000 UM/Month bonus)
Machine driver	7.000 UM/Month	
Driver team leader	7.854 UM/Month	
Specialized worker	8.977 UM/Month	(+ 3.000 UM/Month bonus)
Secretary	9.424 UM/Month	
Administrative assistant	11.079 UM/Month	(+ 4.000 UM/Month bonus)
Mechanic	12.599 UM/Month	

Bonuses correspond to activities calling for responsibilities and polyvalence and also to contractual indemnities for supplementary hours.

ANNEX 4

G. I. R. D PROJECT

ROLLING STOCK

EQUIPMENT		Date of Purchase
3	Land-Rover 109 - Santana pick-up	1979 - 1980
1	11/13 Mercedes truck	1979 - 1980
2	British Leyland Land-Rover - station wagon	March 1980
10	Suzuki - Motorcycles - 125 TS (of which 1 unfit for use)	April - March 80
1	Massey-Ferguson tractor - MF 265 with sickle bar, trailer, leveling blade.	February 1981
3	British Leyland Land-Rover - station wagon 109 (Used)	September 1981
1	British Leyland Land-Rover - station wagon 88 (Used) for use in Nouakchott	September 1981
1	D-6 Bulldozer (used)	January 1982
12	Suzuki motorcycles - RE 125 (still in Nouakchott Customs)	February 1982
+	To come : 1 11/13 Mercedes truck (being purchased in Nouakchott	

INFRASTRUCTURES AND MEANS

I - EXPERIMENTAL SITES

1° - Kaédi - clayey soil

Total surface : about 500 ha, of which 25 ha are for the AG/DIV. The rest is divided into 4 blocks of about 120 ha each, for the animal husbandry and ZM/MP divisions.

Barbled-wire fence placed in 1980 AG/DIV parcel protected by wire mesh
Electrical fencing trials in 1981-1982 not very conclusive.

Protection by fire-breaks.

The site is equipped with :

- a vaccination corral and animal weighing station
- buildings for herding and treatment
- 3 catchment basins of which one is being cemented.

2° - Niarounalle (Sandy - Clayey degraded soil)

- Total surface : 20 ha of which 15 ha belong to the Nature Protection division and 5 ha are for agronomical trials.
- Installé en 1981 a barbled wire fence and mesh.
- Protection by fire-breaks
- Site equipped with :
  - . 2 wells
  - . 1 ware house

3° - Singha (Sandy soil)

- Total surface : 5 ha of which 3 ha are for Nature Protection and 2 ha are for Agriculture.
- Installed in 1980, barbled wire fence and wire mesh
- Fire break protection
- Ware house - 1 well

II - NURSERY

About 1 ha for the EM/NP and Agriculture divisions. Installed in 1980, barbled wire fence and wire mesh, quickset hedge and wind breaks. 2 wells. warehouse.

III - PROJECT BASE

Includes : offices, buildings for the logistic division (garage, warehouse, etc...) POL stock rooms (building , 2 tanks), the base is fenced in.

IV - ANIMAL TRACTION EXTENSION AND TRAINING CENTERS

The Project implemented 5 centers (light buildings in the villages) in Selibaby, Koumba N'Dao, Dialla, Danguerimou and Soufi.

ANNEXE 5

RESULTS OF THE AGRONOMY DIVISION

The Project started in April 1979. The first year was mainly devoted to the implantation, personnel, materials and infrastructures. Research activities and the start of extension activities didn't really start before the rainy season 1980-1981. This first campaign was characterized by unfavourable rainfall : average precipitation 488 mm from June to October, but necessity to sow again after an early rain hurt as did an abrupt stop of rainfall in mid-September. The results are little or not at all usable. Rainfall of the 1981-1982 campaign (454 mm) were less unfavourable, despite an abrupt early stops of the rains in mid-September, thanks to a good distribution. All varieties have suffered even the earliest ones, but most of the yields were sufficient to allow for an interpretation and initial conclusions.

I - TRIALS RESULTS (See chart n° 1)

Sorghum variety trials allowed the selection of a sufficient amount of imported varieties having superior qualities to the local ones for yield, height of plants, resistance to drought, size and quality of panicles. The selection of the chosen varieties will be pursued. Next rainy season the E-35-1 variety will be extended in the low land zones.

Trials of striga-resistant sorghum varieties yielded very positive results. Nine varieties are retained for a trial follow-up.

The varieties, having at the same time the characteristics of striga resistancy, productivity and seed quality will then be extended to the striga-infested zones.

Maize variety trials did not display any higher yielding variety compared to the control ones, probably because of quite adverse conditions : rainfall shortage,absence of fertilizers.

Niebé variety trials showed 14 varieties with yields higher than 1 T/ha. This trial will be pursued.

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Millet variety trials did not yield any results because of a too week germination.

Plowing trials (and demonstration fields) have displayed the efficiency of this technique (+ 15 % on the Katamanghe). Trials on other cultivation techniques (spacing, crop association) have generally confirmed the techniques already in use by the peasants.

II - EXTENSION RESULTS

Five extension and training centers were implemented in Salibaby, Dialla, Dangueriscou, Koumba M'Dao and Soufi. Each is an equipped animal training center.

Extension centers on 16 "pilot peasants" who apply all the techniques extended on demonstration fields : plowing, seed treatment, sowing density, early thinning out, early and continuous weeding, earthing up. The output of these demonstration fields are compared to the output of traditionnaly cultivated fields. This year, there was a 50 % higher yield on demonstration plots (see chart n° 3).

Extension of truck farming techniques permitted the establishment of 43 individual gardens and of 7 collective gardens grouping 82 truck farmers in 9 villages of the DIE.

III - PRODUCTION AND DISTRIBUTION OF CEREAL SEEDS

In order to increase yields, the Project extends the use of seed varieties well adapted to the region and of a higher yield type : souna III (millet), sidi-Nieleba (short-cycle local sorghum variety), E-35-1 (imported long-cycle sorghum variety). It was necessary to produce certain quantities of seeds.

1980-81 =	+ souna III production	=	450 kg
1981-82 =	+ souna III distribution	=	450 kg
	sidi nieleba	=	300 kg
	sidi nieleba production	=	1.655 kg
	E-35-1	=	446 kg

which will be distributed next campaign.

CHART n° 1

SPECIE	NATURE OF TRIAL	VARIETY TRIALS		RESULTS - CONCLUSION
		No.of tested varieties	Origin of variety	
Sorghum	Behaviour without repetition	20	ICRISAT (10) SAFGRAD (10)	Control : no yield (lack of water) - 10 varieties yielded from 2000 to 4000 kg/ha and will be retained and continued next year
Sorghum	Output - 3 repetitions	7	SAFGRAD (7) USDA (1) E-35-1	Control : 1.100 to 1.700 kg/ha - 5 varieties yielding from 1.800 kg to 2.800 kg/ha will be retained and continued
Maize	Output - 4 repetitions	11	IITA	Control : 1.976 kg/ha No variety gave a higher yield
Niebe	Output - 2 repetitions	19	IITA	Control : 550 kg/ha - 14 varieties having yielded over 1.000 kg/ha will be retained and continued
Sorghum	Striga-resistance - 3 repetitions	21	SAFGRAD	Control : 400 kg/ha - 9 varieties yielded over 1.000 kg/ha will be retained and continued
Millet	Output - 3 repetitions	9	ICRISAT (3) USDA (6)	No results, weak germination on each parcel

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CULTIVATION TECHNIQUE TRIALS

TECHNIQUE	SITE	TRIAL DESCRIPTION	RESULTS
Plowing	K	1 - Scraping before rains and plowing after 2 - Only plowing after rains 3 - Traditionnal (noplowing)	- no difference between 1 and 2 - 1,2 : 15 % superior to 3
Crop spacing	K	Latin square 1 - 100 x 50 2 - 100 x 30 3 - 75 x 50	- Sorghum : 1 and 2, 20 to 40 % higher yielding than other spacing A similar trial with ground nut did not yield significative difference
Crop association	K	1 - Sorghum (1) niebe between lines 2 - Sorghum (2) " " " 3 - Sorghum (1) groundnut " " 4 - Sorghum (2) " " " 5 - Traditionnal : sorghum and niebe	- Weak sorghum output - Traditionnal technique yielded best for sorghum-niebe. For sorghum-groundnut, superiority of the 2 m spacing
Millet spacing	S		- Best results for 75 to 100 cm between lines and for 50 cm on the line
	S	No results for other trials on cultivation techniques in the singha	

CHART n° 3

ACTIVITIES OF THE EXTENSION AND ANIMAL TRAINING CENTERS

CENTER	VARIETIES	Yield Kg/ha		% Increase	TOTAL ployed Surf. m²	TRAINED	MATERIAL SOLD	PEASANTS CONTACTED
		Improv.	Tradit.					
Selibaby	Felah Felah Felah	2.465 1.465 2.095	1.930 1.105 1.095	27 % 32 % 90 %	70.000	8 horses 5 teams of oxen	16 horse carts 20 asine " 1 bovine " 4 plows	5 pilot peasants 70 peasants contacted
Danguerimou	Felah Sidi Nieleba Samba Dieneba Souma III	2.120 2.020 2.420 1.920	1.360 1.185 1.640	56 % 70 % 48 %	70.000	1 horse 1 team of oxen	2 carts	5 pilot peasants 25 peasants contacted
Diala	Felah	1.125	790	42 %	2.000	5 horses 1 team of oxen	1 plow	5 pilot peasants 40 peasants contacted
Soufi	No results (incompetent extension agent)					1 team of oxen		20 peasants contacted
Koumba N'Dao	1 field	no result as yet				2 teams of oxen		1 pilot peasant 20 peasants contacted

PRICE AND SALE CONDITIONS FOR ANIMAL TRACTION EQUIPMENT

		DOWN PAYMENT	1 st ANNUITY	2d ANNUITY
Occidental hoe (Complete equipment)	Cash	7.550		
	Credit 1 year	3.950	3.950	
	Credit 2 years	3.950	2.075	2.075
Plows "CF 000 P"	Cash	6.490		
	Credit 1 year	3.400	3.400	
	Credit 2 years	3.400	1.780	1.780
Sower "Super ECO"	Cash	6.300		
	Credit 1 year	3.300	3.300	
	Credit 2 years	3.300	1.725	1.725
	Credit 2 years	2.300	2.300	2.300
Mixer - Family type	Cash	1.880		
	Credit 1 year	985	985	
	Credit 2 years	985	515	515
Asine cart	Cash	14.320		
	1 year	7.500	7.500	
	2 years	7.500	3.925	3.925
	2 years	5.230	5.230	5.230
Equine cart	Cash	16.500		
	1 year	8.400	8.400	
	2 years	5.650	5.875	5.875
Bovine cart	Cash	17.500		
	1 year	8.650	8.650	
	2 years	6.000	5.750	5.750
Bovine cart	Cash	19.610		
	1 year	10.000	10.000	
	2 years	10.000	5.100	5.100

ANNEX C

(Original text in French)

PROJET D. R. I. G

SELIBABY

Selibaby, 01/06/82

Dep N° 0001/022/82

1981 RAINY SEASON CAMPAIGN PRELIMINARY REPORT AND BROAD OUTLINE OF THE AGRONOMICAL DIVISION 1982 PROGRAM

This report aims to :

- Present a resume of the results and preliminary conclusions for the 1981 rainy season campaign, while waiting for the definitive results statistically interpreted, which will be published in the yearly report.
- To sketch the broad outlines of the 1982 program, based on the results obtained during the 1981 campaign.

I - Objective

The Project objective, in agricultural production is to improve the production of cereal crops and leguminous crops (principally sorghum, millet, niebe, ground nut) and also of truck farming, within the DRI.

Taking into account a certain number of limiting factors ecologically speaking (climate, soil, cultivated species), techniques (research and extension), and socio-economical factors (finance, economic motivation, tools and equipment, village organization, health, litteracy training, etc), the AG/LIV oriented its activities in the following fields in order to attain the determined objective.

1° - Selection of early maturing, drought resistant, rain resistant (short to middle length stalk), disease resistant varieties, adapted to local ecological conditions and yielding an output superior to that of local varieties.

2° - Experimentation with improved cultural techniques (in comparison to traditional techniques) such as animal traction tilling, plant spacing, culture association, improvement of soil fertily by non-costly methods (manure, green fertilizer, fallow).

3° - Introduction of animal traction and of the various fundamental techniques whose applications still remain restricted. These simple and non-costly techniques are principally : cultivation in rings of earth perpendicular to the slope, sowing in line with suitable spacing, early thinning out with two to three plants per cord hole, weeding, hoeing, earthing up, pest collection, etc...

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4° - Creation in DIZ villages level of animal traction training centers, animal training and extension of the improved techniques using the demonstration fields ot the pilot farmers.

5° - Sale, at cost price and on credit to the peasants of animal traction materials and equipment, and of trained animals.

6° - Organising village meetings where the Project staff can exchange experiences with the peasants and educate them to the accomplish our common program.

7° - Organising of peasants' visits to the Project sites in order that they be able to observe the results of extendable trials.

8° - Training of technically trained personnel for the agricultural research and extension work.

II - Program and preliminary results of the 1981 rainy season campaign

The 1981 campaign rainfall was unfavorable for all the experimental sites, since the rains stopped very early, in mid-september (for a total fo 454 mm). All of the varieties, even the earliest maturing, ones, suffered due to lack of water during their grain-formation stage (grains are smaller than average). Consequently the results of all our trials were relative to site-levels, and could have been better on low-land soils.

1° - Program realised in the experimental sites

The Project's three sites are characterized by three different types of soil :

- Katamangue : a heavy clayey soil, fairly rich in organic matter, its water retention capacity is relatively good ;
- Singha : a light sandy soil, quite poor in organic matter, and having a low water retention capacity ;
- The Hiaroumalle : a hard and weathered soil.

Accomplishments on all three sites are the following.

a) - Varietal trials : Varietal trials of sorghum, maize and millet have been undertaken in the Katamangue ; a niebe varietal trial has been performed in the Singha, a striga resistant sorghum variety trial has been performed in a peasant's field.

Sorghum : a non repetitive behavioral trial with 20 varieties from SAFGRAD/Upper-Volta, and 1 variety from ICRISAT/Bamako was carried out with the following results : 10 varieties yielded 2000 kg/ha to 4000 kg/ha (while the local control didn't yield at all due to lack of water). They were also smut and laying-resistant. There have been choosen for comparative yield trials for next year's campaign.

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A three-repetition comparative yield trial with 9 varieties of which 7 come from SAFGRAD/Nigeria, 1 from Perdue University/USA and the E 35-1 variety (already cultivated in several African countries) has been performed with the following results : 5 varieties yielded 1800 kg/ha and 2800 kg/ha (local control varieties yielded 1100 kg to 1700 kg/ha) and were laying and smut resistant. These have been selected for future adaptation trials at the village level.

Maize : A 4 repetition comparative yield trial with 11 varieties provided by IITA/Upper-Volta, has been carried and with the following results. The variety has yielded more than the local control variety (1976 kg/ha). This could be explained by the fact there was a lack of water and that no fertilizer was used.

Niebe : A 2 repetition comparative yield trial, with 19 varieties provided by IITA/Upper-Volta, has been carried out with the following results : 14 varieties having yielded quantities superior to 1000 kg/ha (local control variety = 550 kg/ha) have been selected for future trials of niebe cultivation alone and in association, on the sites and at villages level.

Striga resistant sorghum varietal trial : A 3 repetition trial, with 21 varieties provided by SAFGRAD/Upper-Volta, was performed in a striga infested field. Results : 9 varieties having yielded over 1000 kg/ha (local control = 400 kg/ha) have been selected for future trials at villages level.

Millet : A 3 repetition comparative yield trial with 9 varieties of which 6 were provided by Kansas University/USA and 3 by hrid varieties from ICRISAT/Bamako, was performed without any success, following the low germination rate on all experimental plots.

b) - Cultivation technique trials : Trials on cultivation techniques have been undertaken on the Katamanghe and singha sites, only the soil fertility test has been done on all three sites (Katamanghe, Singha, Kisrousmille).

Results obtained in Katamanghe : A tilling trial : preliminary results have shown that the plot scraped (before the rains) and tilled (after the rains) isn't different from the plot only tilled (after the rains). Thus scraping alone has no influence on Katamanghe sorghum yield. This can be explained by the fact that the heavy soil doesn't allow efficient scraping and presents many deep crevices allowing a more important infiltration than in the case of scraping.

Concerning the tilled plot and the untilled plot, the former had a higher yield (+ 15 %).

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Spacing trials :
For sorghum and millet, spacing of 100 cm between the lines and of 30/50 cm on lines have given a higher yield (from 20 % to 40 %, in comparison to the others). This confirms, the spacing currently applied by the local peasants in the region.

Crops association trial :
The different treatments have given a low sorghum yield (160 to 430 kg/ha). The traditional practice (a mix of sorghum and niebe sowed together), used as control, has given the higher yield in sorghum (430 kg/ha). In association, ground nut would be more appropriate than niebe, and the 2 m sorghum spacing between the lines would give a higher yield to the one obtained with a 1 m spacing.

Results in singha :
No results were obtained, whatsoever on sorghum cultivation techniques trials. This is caused by the Sandy structure of the singha, which has suffered more from drought than the Katamanghe, and that the local variety (Nebane, used late and with a low resistance to drought, gave few or no panicles to harvest). Only the spacing trial on millet (Souna III) gave valid results : spacings of 75 to 100 cm between the lines and of 50 cm on the lines have given the higher yield. The peasants common practice is to space them from 80 to 100 cm in all directions.

e) - Seed production : Two sorghum varieties were cultivated for seed production on the Katamanghe site : the local variety early maturing Sidi Kialiba having Yielded 2400 kg/ha for a total production of 1655 kg, and the introduced E 35-1 variety whose yield was 820/ha for a total production of 446 kgs. Although the final yield of this variety is relatively low in comparison to the local variety (due to lack of rains at the end of the season) it is to be hoped that this variety be introduced in the low-lands, where it most probably would bring a higher yield, due to it interesting characteristics : average size (1,80 m) drought and laying resistance during its growth, big and dense panicle, maturing earlier than the local varieties most used (Felah and Nebane). Furthermore it caught the interest of most of the peasants visiting Katamanghe.

2° - Program realized in the DRI villages

The program's objective was to introduce animal traction and extend several simple techniques, not too costly, to improve sorghum yields. Five training centers for animal traction and techniques extensions were opened in Solibaby, Dangueriroua, Diala, Coumba Mbao and Soufi.

Each center is staffed by an extension agent trained in animal traction and improved techniques extension, an animal trainer and a helper. Each center also has a pair of oxen, one or two plows and an ox-cart.

Works done in the centers and results obtained were as follow :

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a) - Selibaby center

Demonstration fields : All demonstration fields have been ploughed by animal traction and cultivated with improved techniques (seeds treated with fungicide and insecticide, seeding in seed-holes of 100 cm x 40 - 50 cm, early thinning out at 2 - 2 plants per seed-hole, early and kept up holing weeding, earthing up, etc).

Results compared to traditionnaly cultivated fiels

1st field - Fellah variety
Demonstration - yield 2465 kg/ha
Traditionnal - Yield 1930 kg/ha
Yield increase percentage - 27 %

2d field - Fellah
Demonstration - 1465 kg/ha
Traditionnal - 1105 kg/ha
% increase = + 31 %

A demonstration field of the cultivation method of earth ridges perpendicular to the slope added to improved techniques shows a distinct difference compared to traditionnally cultivated field without earth-ridges more vigorous vegetation, bigger and denser panicles. This demonstration field yield could not also be measured due to an error at harvest time. But by qualitative estimation, one could guess an increase in the order of 50 %.

Other activities : Results of the center's other activities are as follow :

Surface ploughed : (Demonstration and other : 70.000 m2)
Animals trained : 8 horses, 5 pairs of oxen
Material sold : 16 horse carts, 20 donkey carts, 4 ploughs, 1 ox-cart.
Material repaired: 3 ploughs, 3 seeders, 2 weeders, 1 polycultor.
Pilot peasants : 5 including a woman

Other peasants contracted : over 70 peasants were contacted for seed distribution of Sidinialiba (early maturing sorghum) and of Souna III (millet), also for the extension of improved techniques.

Peasants reaction : favorable on the whole, following the practical and concrete results obtained. All the pilot peasants have shown their desire to continue with the Project, and other peasants wish to join for next campaign. Some of them want to buy ploughs and numerous are those who desire obtaining seed of the new varieties they witnessed in Keturaughe.

b) - Dangueripou center :

All the demonstration fields were ploughed by animal traction and cultivated with improved techniques

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Results in comparison to fields traditionnally cultivated :

1st field : (Fellah variety)
Demonstration - 2120 kg/ha
Traditionnal - 1360 kg/ha
Increase = + 56 %

2d field : (Sidinialiba)
Demonstration - 2020 kg/ha
Traditionnal - 1185 kg/ha
Increase = + 70 %

3d field : (Samba Diamaba variety)
Demonstration : (performed by Project team) = 2420 kg/ha
Traditionnal : = 1640 kg/ha
Increase : + 48 %

4d field : (Pilot-Sonna III)
improved techniques demonstration - noploughing - low-land soil = yield 1320 kg/ha.

Other activities : Results of the center other activities are as follow :

ploughed land surface	= 7.000 m2
trained animals	= 1 pair of oxen, 1 horse
material sold	= 2 carts
number of pilot peasants	= 3
number of peasants affected	= 25 families

Peasants reaction : All the pilot peasants and some others are convinced of the worth of animal traction and improved techniques. They are well disposed to cooperate with the Project and follow technical advice for the next rainy season campaign. They particularly wish to obtain the new sorghum varieties tested in Katanangue.

e) - Diala Center :

Demonstration fields : All demonstration fields have been ploughed by animal traction and cultivated following improved techniques. Results compared to traditionnally cultivated fields :

1st field : (Fellah variety)
Demonstration : 1125 kg/ha
Traditionnal : 790 kg/ha
Increase : + 42 %

2d field : (Fellah variety)
Demonstration : 1525 kg/ha
Traditionnal : 1255 kg/ha
Increase : + 21 %

3d field : (Fellah variety)
Demonstration : (performed by Project team) : 2025 kg/ha
Traditionnal : 1255 kg/ha
Increase : + 61 %

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Other activities : Results of the center other activities are as follow :

ploughed land surface	: (Demonstration) 2800 m2
animals trained	: 5 horses, 1 pair of oxen
material sold	: 1 plough
material maintained	: 7 ploughs, 2 carts
number of pilot peasants	: 5
number of peasants affected	: 40 other peasants were contacted for the extension of improved techniques.

Peasants reaction : All the pilot peasant and others have been convinced of the worth of animal traction and improved techniques. Numerous are those who have requested project assistance, for next campaign, for different topics such as, material purchase, application of improved techniques, obtaining of the new sorghum varieties they witnessed in Katanaghe.

d) - Soufi center

Demonstration fields : Demonstration fields and traditionnal methods yields were impossible to calculate, since we changed the extension agent. The new extension agent is as inactive and incompetent as the farmer one, so that the production plots were not realized.

Other activities : One pair of oxen trained, and around 20 peasants affected by the demonstration of animal traction and the extension of improved techniques.

e) - Coumba Mbao center

Demonstration fields : only one demonstration field has been realized in Yegui, 15 km from Koumba Mbao, no yield has been determined since the harvest isn't yet finished.

Other activities : 2 pairs of oxed trained, 2 ploughs repaired and around 20 peasants affected.

Remarks :

1° - Demonstration fields usually occupy the high spots of land, since peasants prefer to keep the low-lands for traditionnal cultivation ; consequently the differences between demonstrative and non demonstrative fields would have been greater, had they been on the same type of terrain.

2° - The centers of Soufi and Coumba Mbao didn't yield satisfactory results due to the inertia and incompetence of their agents.

3° - Preliminary conclusion on works realized in 1981
Results of the previously enumerated tasks permitted to draw the following first conclusions.
Varietal trials on sorghum permitted to select a sufficient amount of foreign varieties having superior qualities to the local ones, on an early maturing, height, drought resistance, bigness and density of panicles, and yield point of view.

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The selection of these varieties will be kept up at sites level (to confirm results) and in the villages (for adaptation to local conditions), the S 35-1 variety, of which certain qualities have been demonstrated in the production plots, could be extended in the low-land zones, next rainy season.

- Maize varietal trials haven't yielded any workable results, since the yield of the introduced varieties were all inferior or equal to the local control varieties. This is caused principally by the lack of water and fertilizers.

- Niebe varietal trials gave a certain amount of varieties whose yield is at least twice superior to the local control varieties. Some of them will be adapted to the local conditions, in order to replace the local varieties.

- Striga resistant sorghum varieties have given positive results. Certain varieties possessing a characteristic combination of striga resistance, productivity and seed quality, will be selected and extended in striga infected zones.

- Tilling trials, and also demonstration fields have shown that, ploughing, done on high grounds and slopes, have had superior yields to the ones imploughed. All the pilot peasants have noticed that unploughed fields were desiccating faster than ploughed ones.

- Trials on cultivation techniques, such as spacing and associated crops have generally confirmed the practices in use now by the peasants.

- The demonstration of sorghum cultivation on earth ridges perpendicular to the slope has shown a great difference, compared to the control field which did not have earth ridges size of panicles and yield. This demonstration has to be generalized on sloping terrains.

- Improved technique demonstrations, simple and now costly, have been conclusive, they convinced many peasants to apply them during next year's campaign.

- Finally, the introduction of animal traction is now an established fact for a great number of peasants. There remains to be resolved the important problem of financing the purchase of the equipment and of the animals in order that animal traction be largely applied in the DZE.

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G.I.R.D PROJECT, DRAFT REMUNERATION

Laborers	3.715 UM/month	
Assistant driver	3.715 UM/month	
Runner	3.715 UM/month	
House watchman	3.803 UM/month	(Gov. = 4.275 UM)
Assistant cooks	4.000 UM/month	
Animal trainer assistant	4.072 UM/month	
Animal trainer	4.715 UM/month	
Foreman	4.715 UM/month	
Painter	4.715 UM/month	
Shepherd	5.000 UM/month	
Extension agent	6.000 UM/month	(Gov. = 6.072 UM)
Clerk	6.072 UM/month	
Warehousemen	6.502 UM/month	(+ 3.000 UM/month bonus)
Electrician assistant	6.600 UM/month	(+ 3.000 UM/month bonus)
Driver	6.905 UM/month	(+ 1.000 UM/month bonus)
Machine driver	7.000 UM/month	
Driver team leader	7.854 UM/month	
Specialized worker	8.977 UM/month	(+ 3.000 UM/month bonus)
Secretary	9.424 UM/month	
Administrative assistant	11.079 UM/month	(+ 4.000 UM/month bonus)
Mechanic	12.859 UM/month	

Bonuses correspond to activities calling for responsibilities and polyvalence and also to contractual indemnities for supplementary hours.

ANNEX 4

G. I. R. D PROJECT

ROLLING STOCK

EQUIPMENT		Date of Purchase
3	Land-Rover 109 - Santana pick-up	1979 - 1980
1	11/13 Mercedes truck	1979 - 1980
2	British Leyland Land-Rover - station wagon	March 1980
10	Suzuki - Motorcycles - 125 TS (of which 1 unfit for use)	April - March 80
1	Massey-Ferguson tractor - MF 265 with sickle bar, trailer, leveling blade.	February 1981
3	British Leyland Land-Rover - station wagon 109 (Used)	September 1981
1	British Leyland Land-Rover - station wagon 88 (Used) for use in Nouakchott	September 1981
1	D-6 Bulldozer (used)	January 1982
12	Suzuki motorcycles - TS 125 (still in Nouakchott Customs)	February 1982
+	To come : 1 11/13 Mercedes truck (being purchased in Nouakchott	

INFRASTRUCTURES AND MEANS

I - EXPERIMENTAL SITES

1° - Katamanghe - clayey soil

Total surface : about 500 ha, of which 25 ha are for the AG/DIV. The rest is divided into 4 blocks of about 120 ha each, for the animal husbandry and ZM/NP divisions.

Barbled-wire fence placed in 1980 AG/DIV parcel protected by wire mesh
Electrical fencing trials in 1981-1982 not very conclusive.

Protection by fire-breaks.

The site is equipped with :

- a vaccination corral and animal weighing station
- buildings for herding and treatment
- 3 catchment basins of which one is being cemented.

2° - Niarouwalle (Sandy - Clayey degraded soil)

- Total surface : 20 ha of which 15 ha belong to the Nature Protection division and 5 ha are for agronomical trials.
- Installed in 1981 a barbled wire fence and mesh.
- Protection by fire-breaks
- Site equipped with :
  - 2 wells
  - 1 ware house

3° - Singha (Sandy soil)

- Total surface : 5 ha of which 3 ha are for Nature Protection and 2 ha are for Agriculture.
- Installed in 1980, barbled wire fence and wire mesh
- Fire break protection
- Ware house - 1 well

II - NURSERY

About 1 ha for the EH/NP and Agriculture divisions. Installed in 1980, barbled wire fence and wire mesh, quickset hedge and wind breaks. 2 wells. warehouse.

III - PROJECT BASE

Includes : offices, buildings for the logistic division (garage, warehouse, etc...) POL stock rooms (building , 2 tanks), the base is fenced in.

IV - ANIMAL TRACTION EXTENSION AND TRAINING CENTERS

The Project implemented 5 centers (light buildings in the villages) in Selibaby, Koumba N'Dao, Dialla, Danguerimou and Soufi.

ANNEXE 5

RESULTS OF THE AGRONOMY DIVISION

The Project started in April 1979. The first year was mainly devoted to the implantation, personnel, materials and infrastructures. Research activities and the start of extension activities didn't really start before the rainy season 1980-1981. This first campaign was characterized by unfavourable rainfall : average precipitation 488 mm from June to October, but necessity to sow again after an early rain hurt as did an abrupt stop of rainfall in mid-September. The results are little or not at all usable. Rainfall of the 1981-1982 campaign (454 mm) were less unfavourable, despite an abrupt early stops of the rains in mid-September, thanks to a good distribution. All varieties have suffered even the earliest ones, but most of the yields were sufficient to allow for an interpretation and initial conclusions.

I - TRIALS RESULTS (See chart n° 1)

Sorghum variety trials allowed the selection of a sufficient amount of imported varieties having superior qualities to the local ones for yield, height of plants, resistance to drought, size and quality of panicles. The selection of the chosen varieties will be pursued. Next rainy season the E-35-1 variety will be extended in the low land zones.

Trials of striga-resistant sorghum varieties yielded very positive results. Nine varieties are retained for a trial follow-up.

The varieties, having at the same time the characteristics of striga resistancy, productivity and seed quality will then be extended to the striga-infested zones.

Maize variety trials did not display any higher yielding variety compared to the control ones, probably because of quite adverse conditions : rainfall shortage, absence of fertilizers.

Niebé variety trials showed 14 varieties with yields higher than 1 T/ha. This trial will be pursued.

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Millet variety trials did not yield any results because of a too weak germination.

Plowing trials (and demonstration fields) have displayed the efficiency of this technique (+ 15 % on the Ratamanghe). Trials on other cultivation techniques (spacing, crop association) have generally confirmed the techniques already in use by the peasants.

II - EXTENSION RESULTS

Five extension and training centers were implemented in Selibaby, Dialla, Dangueirou, Koumba N'Dao and Soufi. Each is an equipped animal training center.

Extension centers on 16 "pilot peasants" who apply all the techniques extended on demonstration fields : plowing, seed treatment, sowing density, early thinning out, early and continuous weeding, earthing up. The output of these demonstration fields are compared to the output of traditionnaly cultivated fields. This year, there was a 50 % higher yield on demonstration plots (see chart n° 3).

Extension of truck farming techniques permitted the establishment of 43 individual gardens and of 7 collective gardens grouping 82 truck farmers in 9 villages of the DIZ.

III - PRODUCTION AND DISTRIBUTION OF CEREAL SEEDS

In order to increase yields, the Project extends the use of seed varieties well adapted to the region and of a higher yield type : souna III (millet), sidi-Nieleba (short-cycle local sorghum variety), E-35-1 (imported long-cycle sorghum variety). It was necessary to produce certain quantities of seeds.

1980-81	= + souna III production	=	450 kg
1981-82	= + souna III distribution	=	450 kg
	sidi nieleba	=	300 kg
	sidi nieleba production	=	1.655 kg
	E-35-1	=	446 kg

which will be distributed next campaign.

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CHART n° 1

SPECIE	NATURE OF TRIAL	VARIETY TRIALS		RESULTS - CONCLUSION
		No.of tested varieties	Origin of variety	
Sorghum	Behaviour without repetition	20	ICRISAT (10) SAFGRAD (10)	Control : no yield (lack of water) - 10 varieties yielded from 2000 to 4000 kg/ha and will be retained and continued next year
Sorghum	Output - 3 repetitions	7	SAFGRAD (7) USDA (1) E-35-1	Control : 1.100 to 1.700 kg/ha - 5 varieties yielding from 1.800 kg to 2.800 kg/ha will be retained and continued
Maize	Output - 4 repetitions	11	IITA	Control : 1.976 kg/ha No variety gave a higher yield
Niebe	Output - 2 repetitions	19	IITA	Control : 550 kg/ha - 14 varieties having yielded over 1.000 kg/ha will be retained and continued
Sorghum	Strigm-resistance - 3 repetitions	21	SAFGRAD	Control : 400 kg/ha - 9 varieties yielded over 1.000 kg/ha will be retained and continued
Millet	Output - 3 repetitions	9	ICRISAT (3) USDA (6)	No results, weak germination on each parcel

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CULTIVATION TECHNIQUE TRIALS

TECHNIQUE	SITE	TRIAL DESCRIPTION	RESULTS
Plowing	K	1 - Scraping before rains and plowing after 2 - Only plowing after rains 3 - Traditionnal (noplowing)	- no difference between 1 and 2 - 1,2 : 15 % superior to 3
Crop spacing	K	Latin square 1 - 100 x 50 2 - 100 x 30 3 - 75 x 50	- Sorghum : 1 and 2, 20 to 40 % higher yielding than other spacing A similar trial with ground nut did not yield significative difference
Crop association	K	1 - Sorghum (1) niebe between lines 2 - Sorghum (2) " " " 3 - Sorghum (1) groundnut " " 4 - Sorghum (2) " " " 5 - Traditionnal : sorghum and niebe	- Weak sorghum output - Traditionnal technique yielded best for sorghum-niebe. For sorghum-groundnut, superiority of the 2 m spacing
Millet spacing	S		- Best results for 75 to 100 cm between lines and for 50 cm on the line
	S	No results for other trials on cultivation techniques in the singha	

CHART n° 3

ACTIVITIES OF THE EXTENSION AND ANIMAL TRAINING CENTERS

CENTER	VARIETIES	Yield Kg/ha		% Increase	TOTAL ployed Surf. m²	TRAINED	MATERIAL SOLD	PEASANTS CONTACTED
		Improv.	Tradit.					
Selibaby	Felah Felah Felah	2.468 1.465 2.095	1.950 1.105 1.095	27 % 32 % 90 %	70.000	8 horses 5 teams of oxen	16 horse carts 20 asine " 1 bovine " 4 plows	5 pilot peasants 70 peasants contacted
Danguerimou	Felah Sidi Bieleba Sarba Dieneba Souna III	2.120 2.020 2.420 1.920	1.360 1.185 1.640	56 % 70 % 48 %	70.000	1 horse 1 team of oxen	2 carts	5 pilot peasants 25 peasants contacted
Diala	Felah	1.125	790	42 %	2.000	5 horses 1 team of oxen	1 plow	5 pilot peasants 40 peasants contacted
Soufi	No results (incompetent extension agent)					1 team of oxen		20 peasants contacted
Koumba N'Dao	1 field	no result as yet				2 teams of oxen		1 pilot peasant 20 peasants contacted

PRICE AND SALE CONDITIONS FOR ANIMAL TRACTION EQUIPMENT

		DOWN PAYMENT	1 st ANNUITY	2d ANNUITY
Occidental hoe (Complete equipment)	Cash	7.550		
	Credit 1 year	3.950	3.950	
	Credit 2 years	3.950	2.075	2.075
Plows "CF 000 P"	Cash	6.490		
	Credit 1 year	3.400	3.400	
	Credit 2 years	3.400	1.780	1.780
Sower "Super ECO"	Cash	6.300		
	Credit 1 year	3.300	3.300	
	Credit 2 years	3.300	1.725	1.725
	Credit 2 years	2.300	2.300	2.300
Mixer - Family type	Cash	1.880		
	Credit 1 year	985	985	
	Credit 2 years	985	515	515
Aging cart	Cash	14.320		
	1 year	7.500	7.500	
	2 years	7.500	3.925	3.925
	2 years	5.230	5.230	5.230
Equine cart	Cash	16.500		
	1 year	8.400	8.400	
	2 years	5.650	5.875	5.875
Bovine cart	Cash	17.500		
	1 year	8.650	8.650	
	2 years	6.000	5.750	5.750
Bovine cart	Cash	19.610		
	1 year	10.000	10.000	
	2 years	10.000	5.100	5.100

ANNEX C

(Original text in French)

PROJET D. R. I. G

SELIBABY

Salibaby, 01/06/82

Dep N° 0001/022/82

1981 RAINY SEASON CAMPAIGN PRELIMINARY REPORT AND BROAD OUTLINE OF THE AGRONOMICAL DIVISION 1982 PROGRAM

This report aims to :

- Present a resume of the results and preliminary conclusions for the 1981 rainy season campaign, while waiting for the definitive results statistically interpreted, which will be published in the yearly report.
- To sketch the broad outlines of the 1982 program, based on the results obtained during the 1981 campaign.

I - Objective

The Project objective, in agricultural production is to improve the production of cereal crops and leguminous crops (principally sorghum, millet, niebe, ground nut) and also of truck farming, within the DRI.

Taking into account a certain number of limiting factors ecologically speaking (climate, soil, cultivated species), techniques (research and extension), and socio-economical factors (finance, economic motivation, tools and equipment, village organisation, health, litteracy training, etc), the AG/DIV oriented its activities in the following fields in order to attain the determined objective.

1° - Selection of early maturing, drought resistant, rain resistant (short to middle length stalk), disease resistant varieties, adapted to local ecological conditions and yielding an output superior to that of local varieties.

2° - Experimentation with improved cultural techniques (in comparison to traditionnal techniques) such as animal traction tilling, plant spacing, culture association, improvement of soil fertily by non-costly methods (manure, green fertilizer, fallow).

3° - Introduction of animal traction and of the various fundamental techniques whose applications still remain restricted. These simple and non-costly techniques are principally : cultivation on ridges of earth perpendicular to the slope, sowing in line with suitable spacing, early thinning out with two to three plants per seed hole, weeding, hoeing, earthing up, seed selection, etc...

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4° - Creation in DIZ villages level of animal traction training centers, animal training and extension of the improved techniques using the demonstration fields ot the pilot farmers.

5° - Sale, at cost price and on credit to the peasants of animal traction materials and equipment, and of trained animals.

6° - Organising village meetings where the Project staff can exchange experiences with the peasants and educate them to the accomplish our common program.

7° - Organising of peasants' visits to the Project sites in order that they be able to observe the results of extendable trials.

8° - Training of technically trained personnel for the agricultural research and extension work.

II - Progress and preliminary results of the 1981 rainy season campaign

The 1981 campaign rainfall was unfavorable for all the experimental sites, since the rains stopped very early, in mid-septecter (for a total fo 454 mm). All of the varieties, even the earliest maturing, ones, suffered due to lack of water during their grain-formation stage (grains are smaller than average). Consequently the results of all our trials were relative to site-levels, and could have been better on low-land soils.

1° - Progress realised in the experimental sites

The Project's three sites are characterized by three different types of soil :

- Katamangue : a heavy clayey soil, fairly rich in organic matter, its water retention capacity is relatively good ;
- Singha : a light sandy soil, quite poor in organic matter, and having a low water retention capacity ;
- The Hiaroumalle : a hard and weathered soil.

Accomplishments on all three sites are the following.

a) - Varietal trials : Varietal trials of sorghum, maize and millet have been undertaken in the Katamangue ; a niebe varietal trial has been performed in the Singha, a striga resistant sorghum variety trial has been performed in a peasant's field.

Sorghum : a non repetitive behavioral trial with 20 varieties from SAFGRAD/Upper-Volta, and 1 variety from ICRISAT/Bamako was carried out with the following results : 10 varieties yielded 2000 kg/ha to 4000 kg/ha (while the local control didn't yield at all due to lack of water). They were also smut and laying-resistant. There have been chosen for comparative yield trials for next year's campaign.

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A three-repetition comparative yield trial with 9 varieties of which 7 come from SAFGRAD/Nigeria, 1 from Purdue University/USA and the E 35-1 variety (already cultivated in several African countries) has been performed with the following results : 5 varieties yielded 1800 kg/ha and 2800 kg/ha (local control varieties yielded 1100 kg to 1700 kg/ha) and were laying and smut resistant. These have been selected for future adaptation trials at the village level.

Maize : A 4 repetition comparative yield trial with 11 varieties provided by IITA/Upper-Volta, has been carried and with the following results. The variety has yielded more than the local control variety (1976 kg/ha). This could be explained by the fact there was a lack of water and that no fertilizer was used.

Niebe : A 2 repetition comparative yield trial, with 19 varieties provided by IITA/Upper-Volta, has been carried out with the following results : 14 varieties having yielded quantities superior to 1000 kg/ha (local control variety = 550 kg/ha) have been selected for future trials of niebe cultivation alone and in association, on the sites and at villages level.

Striga resistant sorghum varietal trial : A 3 repetition trial, with 21 varieties provided by SAFGRAD/Upper-Volta, was performed in a striga infested field. Results : 9 varieties having yielded over 1000 kg/ha (local control = 400 kg/ha) have been selected for future trials at villages level.

Millet : A 3 repetition comparative yield trial with 9 varieties of which 6 were provided by Kansas University/USA and 3 by krid varieties from ICRISAT/Bamako, was performed without any success, following the low germination rate on all experimental plots.

b) - Cultivation technique trials : Trials on cultivation techniques have been undertaken on the Katamanghe and Singha sites, only the soil fertility test has been done on all three sites (Katamanghe, Singha, Kisrumalle).

Results obtained in Katamanghe : A tilling trial : preliminary results have shown that the plot scraped (before the rains) and tilled (after the rains) isn't different from the plot only tilled (after the rains). Thus scraping alone has no influence on Katamanghe sorghum yield. This can be explained by the fact that the heavy soil doesn't allow efficient scraping and presents many deep crevices allowing a more important infiltration than in the case of scraping.

Concerning the tilled plot and the untilled plot, the former had a higher yield (+ 15 %).

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Spacing trials :
For sorghum and millet, spacing of 100 cm between the lines and of 30/50 cm on lines have given a higher yield (from 20 % to 40 %, in comparison to the others). This confirms, the spacing currently applied by the local peasants in the region.

Crops association trial :
The different treatments have given a low sorghum yield (160 to 430 kg/ha). The traditional practice (a mix of sorghum and niebe sowed together), used as control, has given the higher yield in sorghum (430 kg/ha). In association, ground nut would be more appropriate than niebe, and the 2 m sorghum spacing between the lines would give a higher yield to the one obtained with a 1 m spacing.

Results in singha :
No results were obtained, whatsoever on sorghum cultivation techniques trials. This is caused by the Sandy structure of the singha, which has suffered more from drought than the Katamanghe, and that the local variety (Nebane, used late and with a low resistance to drought, gave few or no panicles to harvest). Only the spacing trial on millet (Souma III) gave valid results : spacings of 75 to 100 cm between the lines and of 50 cm on the lines have given the higher yield. The peasants common practice is to space them from 80 to 100 cm in all directions.

a) - Seed production : Two sorghum varieties were cultivated for seed production on the Katamanghe site : the local variety early maturing Sidi Nieliba having Yielded 2400 kg/ha for a total production of 1655 kg, and the introduced E 35-1 variety whose yield was 820/ha for a total production of 446 kgs. Although the final yield of this variety is relatively low in comparison to the local variety (due to lack of rains at the end of the season) it is to be hoped that this variety be introduced in the low-lands, where it most probably would bring a higher yield, due to it interesting characteristics : average size (1,80 m) drought and laying resistance during its growth, big and dense panicle, maturing earlier than the local varieties most used (Selah and Nebane). Furthermore it caught the interest of most of the peasants visiting Katamanghe.

2° - Program realised in the DRE villages

The program's objective was to introduce animal traction and extend several simple techniques, not too costly, to improve sorghum yields. Five training centers for animal traction and techniques extensions were opened in Solibaby, Dangueriman, Diola, Coumba Ndao and Soufi.

Each center is staffed by an extension agent trained in animal traction and improved techniques extension, an animal trainer and a helper. Each center also has a pair of oxen, one or two plows and an ox-cart.

Works done in the centers and results obtained were as follow :

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a) - Salibeby center

Demonstration fields : All demonstration fields have been ploughed by animal traction and cultivated with improved techniques (seeds treated with fungicide and insecticide, sowing in seed-holes of 100 cm x 40 - 50 cm, early thinning out at 2 - 2 plants per seed-hole, early and kept up holing weeding, earthing up, etc).

Results compared to traditionnaly cultivated fields

1st field - Fellah variety
Demonstration - yield 2465 kg/ha
Traditionnal - Yield 1930 kg/ha
Yield increase percentage - 27 %

2d field - Fellah
Demonstration - 1465 kg/ha
Traditionnal - 1105 kg/ha
% increase = + 31 %

A demonstration field of the cultivation method of earth ridges perpendicular to the slope added to improved techniques shows a distinct difference compared to traditionnally cultivated field without earth-ridges more vigorous vegetation, bigger and denser panicles. This demonstration field yield could not also be measured due to an error at harvest time. But by qualitative estimation, one could guess an increase in the order of 50 %.

Other activities : Results of the center's other activities are as follow :

Surface ploughed : (Demonstration and other : 70.000 m2)
Animals trained : 8 horses, 5 pairs of oxen
Material sold : 16 horse carts, 20 donkey carts, 4 ploughs, 1 ox-cart.
Material repaired: 3 ploughs, 3 seeders, 2 weeders, 1 polycultor.
Pilot peasants : 5 including a woman

Other peasants contracted : over 70 peasants were contacted for seed distribution of Sidinielibe (early maturing sorghum) and of Souna III (millet), also for the extension of improved techniques.

Peasants reaction : favorable on the whole, following the practical and concrete results obtained. All the pilot peasants have shown their desire to continue with the Project, and other peasants wish to join for next campaign. Some of them want to buy ploughs and numerous are those who desire obtaining seed of the new varieties they witnessed in Katarangha.

b) - Dancuerinou center :

All the demonstration fields were ploughed by animal traction and cultivated with improved techniques

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Results in comparison to fields traditionnally cultivated :

1st field : (Fellah variety)
Demonstration - 2120 kg/ha
Traditionnal - 1360 kg/ha
Increase = + 56 %

2d field : (Sidinielibe)
Demonstration - 2020 kg/ha
Traditionnal - 1185 kg/ha
Increase = + 70 %

3d field : (Samba Diamba variety)
Demonstration : (performed by Project team) = 2420 kg/ha
Traditionnal : = 1640 kg/ha
Increase : + 48 %

4d field : (millet-Souma III)
improved techniques demonstration - noploughing - low-land soil = yield 1920 kg/ha.

Other activities : Results of the center other activities are as follow :

ploughed land surface	= 7.000 m2
trained animals	= 1 pair of oxen, 1 horse
material sold	= 2 carts
number of pilot peasants	= 3
number of peasants affected	= 25 families

Peasants reaction : All the pilot peasants and some others are convinced of the worth of animal traction and improved techniques. They are well disposed to cooperate with the Project and follow technical advice for the next rainy season campaign. They particularly wish to obtain the new sorghum varieties tested in Katamangue.

e) - Diola Center :

Demonstration fields : All demonstration fields have been ploughed by animal traction and cultivated following improved techniques. Results compared to traditionnally cultivated fields :

1st field : (Fellah variety)
Demonstration : 1125 kg/ha
Traditionnal : 790 kg/ha
Increase : + 42 %

2d field : (Fellah variety)
Demonstration : 1525 kg/ha
Traditionnal : 1255 kg/ha
Increase : + 21 %

3d field : (Fellah variety)
Demonstration : (performed by Project team) : 2025 kg/ha
Traditionnal : 125[illegible] kg/ha
Increase : + 61

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Other activities : Results of the center other activities are as follow :

ploughed land surface	: (Demonstration) 2800 m2
animals trained	: 5 horses, 1 pair of oxen
material sold	: 1 plough
material maintained	: 7 ploughs, 2 carts
number of pilot peasants	: 5
number of peasants affected	: 40 other peasants were contacted for the extension of improved techniques.

Peasants reaction : All the pilot peasant and others have been convinced of the worth of animal traction and improved techniques. Numerous are those who have requested project assistance, for next campaign, for different topics such as, material purchase, application of improved techniques, obtaining of the new sorghum varieties they witnessed in Katamaghe.

d) - Soufi center

Demonstration fields : Demonstration fields and traditionnal methods yields were impossible to calculate, since we changed the extension agent. The new extension agent is as inactive and incompetent as the former one, so that the production plots were not realized.

Other activities : One pair of oxen trained, and around 20 peasants affected by the demonstration of animal traction and the extension of improved techniques.

e) - Coumba Ndao center

Demonstration fields : only one demonstration field has been realized in Yegui, 15 km from Koumba Ndao, so yield has been determined since the harvest isn't yet finished.

Other activities : 2 pairs of oxed trained, 2 ploughs repaired and around 20 peasants affected.

Remarks :

1° - Demonstration fields usually occupy the high spots of land, since peasants prefer to keep the low-lands for traditionnal cultivation ; consequently the differences between demonstrative and non demonstrative fields would have been greater, had they been on the same type of terrain.

2° - The centers of Soufi and Coumba Ndao didn't yield satisfactory results due to the inertia and incompetance of their agents.

3° - Preliminary conclusion on works realized in 1981
Results of the previously enumerated tasks permitted to draw the following first conclusions.
Varietal trials on sorghum permitted to select a sufficient amount of foreign varieties having superior qualities to the local ones, on an early maturing, height, drought resistance, bigness and density of panicles, and yield point of view.

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The selection of these varieties will be kept up at sites level (to confirm results) and in the villages (for adaptation to local conditions), the E 35-1 variety, of which certain qualities have been demonstrated in the production plots, could be extended in the low-land zones, next rainy season.

- Maize varietal trials haven't yielded any workable results, since the yield of the introduced varieties were all inferior or equal to the local control varieties. This is caused principally by the lack of water and fertilizers.

- Niebe varietal trials gave a certain amount of varieties whose yield is at least twice superior to the local control varieties. Some of them will be adapted to the local conditions, in order to replace the local varieties.

- Striga resistant sorghum varieties have given positive results. Certain varieties possessing a characteristic combination of striga resistance, productivity and seed quality, will be selected and extended in striga infected zones.

- Tilling trials, and also demonstration fields have shown that, ploughing, done on high grounds and slopes, have had superior yields to the ones irploughed. All the pilot peasants have noticed that unploughed fields were desiccating faster than ploughed ones.

- Trials on cultivation techniques, such as spacing and associated crops have generally confirmed the practices in use now by the peasants.

- The demonstration of sorghum cultivation on earth ridges perpendicular to the slope has shown a great difference, compared to the control field which did not have earth ridges size of panicles and yield. This demonstration has to be generalized on sloping terrains.

- Improved technique demonstrations, simple and now costly, have been conclusive, they convinced many peasants to apply them during next year's campaign.

- Finally, the introduction of animal traction is now an established fact for a great number of peasants. There remains to be resolved the important problem of financing the purchase of the equipment and of the animals in order that animal traction be largely applied in the SDZ.

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III - BROADLINES OF THE 1982 ACTION PROGRAM

The objectives of the program realised in 1981 have to be pursued in 1982. Basing one self on the already obtained results, we propose the broad outlines of the 1982 program as follow :

at experimental sites level : It is necessary to perfect all trials to be undertaken in 82, that is :

1° - All the promising sorghum varieties, obtained from varietal trials last year will be used in a comparative yield test, with 4 repetitions, with two local varieties (1 early maturing - one later maturing) as control.

2° - An other preliminary test will be realized with 12 new sorghum varieties provided by the "Texas agricultural experiment station".

3° - Varietal trial of millet, which failed this due to a bad germination, will be redone in the singha (whose soil is proper to millet) with a new stock of seeds provided by the "Kansas Agricultural Experiment Station".

4° - Varietal trial of niebe will be pursued with the promising varieties, in order to arrive to final results.

5° - A rice varietal trial will be realized with rain fed rice varieties provided by the Philippines rice research international institute.

6° - Ploughing, spacing, crop association, and fertility trials will be pursued to obtain definite results.

7° - Trials on the different method of earth ridging (dimension of earth ridges, optimum amount of earth ridges on a given cultivated surface, ridges closed at both ends etc) will be undertaken to determine an economic and efficient method.

IN villages level : The objective to improved cultures productivity will be pursued by the following activities.

1° - Extension of training and popularization centers
The centers will be reinforced in personnel, material and equipment in order to take care of more villages.

2° - Development of animal traction :
Most of the peasants in the staffed villages are already convinced of the technical and economic utility of animal traction. So time have to emphasize the extension of demonstration fields in the other villages, the availability to the peasants of more material (from the AG/sector and from the Project) and on the creation at villages level, of organizations allowing the purchase and the exploitation in common of material and animals to augment yields and eventually cultived surfaces.

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3° - Increase in number of improved techniques demonstration fields : following the peasants visits to the Katsumaghe where they have expressed their satisfaction, and thanks to the results of the demonstrations last year, more demonstration fields will be planted with the collaboration of a greater number of pilot peasants.

4° - Execution of simple trials on promising sorghum varieties and earth-ridges cultivation methods, on the field of pilot peasants, in view of the pre-extension of the varieties and improved techniques, better adapted to the local conditions.

5° - Extension of the new variety E 35-1 which could have a high yield in low-land soil. This variety has given a satisfactory yield in the Katsumaghe and is already appreciated in several African countries.

ANNEX D

(original text in French)

MISSION REPORT

Mr. Gerarld Plon, Directorate of Livestock

Selibaby 02/16/82-02/24/82

I. Mission Objective

Evaluation of the USAID-financed GIRD Project results to date, in the perspective of a second phase of the project (justification and eventual re-orientation).

II. Participants

1. GIRM

Dr. Sy Ibrahima - Governor of Guidimaka
Mr. Lam Hamady - Director of Agriculture
Project Manager - Evaluation Team Leader
Dr. Sidhya - Director of Animal Husbandry
Mr. Kane Hadya - Director of the Protection of Nature Services
Mr. Cane - Technical Advisor to the Director of Agriculture
Dr. Plon - Technical Advisor to the Animal Husbandry Director

2. USAID/Mauritania (Nouakchott)

Mr. Barry J. MacDonald - Evaluation Coordinator
Dr. David W. Carr - Economist
Dr. John Grayzel - Sociologist
Mr. Rudolfo Griego - Range Management Specialist

3. USAID/Selibaby (Experience, Inc.)

Dr. Max Goldensohn - Chief of Party
Mr. Quan Dinh - Agronomist
Mr. Gregory Greenwood - Range Management
Dr. Duane Schaad - Veterinarian - Animal Husbandry
Mr. Jean Varenne - Chief of Logistic Division
Mr. Wone - Chief of Party counterpart
Mr. Ba Khalidou - Chief of AG/Division counterpart
Mr. Ba Somakhe - Chief of RM/NP counterpart
Mr. Kone Moussa - Chief of Animal Husbandry Division counterpart
Mr. Kebe Souleymane 2d counterpart A/h Division

III. Mission Schedule

Wednesday 17th: Arrival of the delegation in Selibaby
Presentation of the Mission program
Project presentation - Mr. Quan's account of the AG/Div work

Mr. Greenwood and Mr. Ba Somakhe: account of the Range Management Division work

Thursday 18th: Visit to the nursery and garden
Visit to the two sites (Singhe and Niarouwalle)
Account by Mr. Kone, Kebe and Dr. Schaad of the work by A/h division;
Account by Mr. Wone of small community-level infrastructure project
Account by Dr. Goldensohn of the socio-economic constraints met by the project

Friday, 19th: Grou visit to five DIZ villages

Saturday, 20th: Visit to two DIZ villages - Meeting with Selibaby pilot peasants/herders.

Sunday, 21st: Visit to a site of improved grazing and of fields managed by women under Project Supervisor - Discussions by work groups - Final meeting - end of evaluation work for all of the Mission members who return to Nouakchott, with the exception of Messrs. Grayzel and Griego who continue to Sani and of Messrs. Carre and Plon, who remain in Selibaby until following Wednesday in order to conduct a deeper evaluation of the results.

Monday, 22nd: Examination of production results with the AG/Div (Mr. Carre) and with the RM/NP and A/h divisions (Dr. Plon)

Tuesday, 23rd: Visit to a DIZ village and meetings with peasants/herders - end of the examination of data

Wednesday, 24th: Messrs. Carre and Plon return to Nouakchott.

IV. Project Presentation

It is out of the question to repeat here a detailed description of the Project activities; for this, one can consult the "Advance Report" presented by Dr. Goldensohn. Our aim is to present the essential points, either positive or negative, in order to draw out any useful information for an eventual second phase - detailed and numbered results concerning animal husbandry and range management will be given in an annex to the present report.

1. General Development of the Project

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In his "Advance Report", the Chief of Party clearly showed the problems encountered by the project at the level of organizing the team of experts, related to the lacunas of the first company contracted by AID, and also to certain personality problems (incompetence or resignation for personal reasons). The result was that the Divisions were unable to start really efficient work before September-October 1980 for Ranage Management; April 1981 for agronomy and May, 1981 for animal husbandry (the expatriate for this division did not arrive until October, 1981).

This is a negative point in the Project development - on the other hand, the GIRD Project at the start was essentially conceived as a research project on three sites. It was the operating team which, to a certain degree, minimized research and recognized the need to extend simple techniques aiming to increase rural production and to settle the population. This is a highly positive aspect which permitted the Project to have a true contact with the population. One has to emphasize too, the impression of excellent contact with the population given by the project expatriates. This also is a highly positive point.

Finally, there is no synthesis document on the exploitation of the results of information gathered by the project in each field of activity.

The January 15, 1982 "Advance Report" done by the Chief of Party, is the first effort in this direction, but to some degree it is incomplete since some interesting and important numbers and information are not included. Need was evident to gather them from the divisions and it appeared that their recording and exploitation were mediocre.

One has to raise the problem of the extension agents which concerns most of the Divisions. It appears that they are now used as assistant technicians rather than extension agents. Furthermore, these extension agents are not polyvalent and this is a debatable point.

2. <u>Agronomy Division</u>

Since his arrival in 1981, the Chief of Division has accomplished <u>considerable</u> work.

The one essential reproach one could formulate (on the Mauritanian side, since the expert only implemented the received instructions) is that he did not limit the selection of improved varieties to be adapted in the Guidimaka and to a certain degree, that he proved again

the efficiency of certain techniques already proven in the Sahel.

The positive side of the Division's work is mainly in the extension of animal traction (Draft cultivation and carts for transport) and also of truck farming cultivation.

These two actions seem to have had a most important impact on the population. The mjor constraints to wider extension are for the peasants (1) the ability to purchase the necessary equipment for animal traction, and (2) water availability for truck farming.

3. Range Management - Nature Protection Division

a) Nature Protection.

The essential activity has been the establishment of a nursery, and later species selection and reforestation of the Project sites. But the spreading of seedlings in the rural environment remains very limited and it seems that the population does not show any eagerness for an activity whose results will only be beneficial in the long run and which will be possible only in protected sites. It is also regretable that the implementation of fire breaks was not effected outside the project sites (due to a lack of equipment, i.e., bulldozer).

b) Range Management

In 14 months of effective activity, the expert of this Division has also accomplished considerable work, according to the initial terms of the Project. This work, however, on the basis of its usefullness for the population is often questionable in its substance and also in its form. The stocking rates trials and grazing land reserves have no possible applications in the foreseeable future.; this was confirmed in discussion with the herders themselves. On the other hand, extension of the stocking of sorghum stalks for distributing to the animals during the most difficult period of the year showed itself very positive. The herders have shown great interest in this activity and regret lacking the means of transport, in order to intensify the stocking of these stalks .

Adaptation trials of leguminous forage species (capanus cajan, dolichos lablab, leuceama lencocephala) are not realistic due to their very hypothetical resistance to the dry season (only leuceama seems to really resist past the month of February), and of their even more hypothetical productivity in a Sahelian climate. (They will be flattened by livestock during the dry season and will not grow back during rainy season).

4. Animal Husbandry Division

This division, more than any other, was late in developing its activities. The stocking of the Katamanghe site is not a major operation, as the Project Direction seems to consider it though

necessary to the development of the activities of this site.

Animal health activities , in a fruitful collaboration with the Regional Veterinary Inspectorate, are very much positive and have been reinforced bythe arrival in October, 1981 of a dynamic and competent expatriate veterinarian, able to show operating techniques and treatments to the nationals. In this context, the training of extension agents and volunteer villagers has all the possibilities to be fruitful for the community. On the other had, zootechnical observations, as foreseen, in the project program, remain still in embryo.

The sale of veterinary drugs is also very positive.

5. Small Projects of Village Infrastructure

This is a highly positive activity of the project. The SPVI's provide an important assistance to the villagers, good publicity for the project and an excellent integration for the team with the population, which did not hide its enthusiasn for this activity whose impact is immediate.

CONCLUSION

One could deplore the fact that the Project was delayed in its beginning and that the results are not reaching expectations and justifying what was spent. However, a strongbase has been developed now, and the intense activity in the Project during the last twelve months has had a true impact on the population.

Beneficial effects are appearing, and, in this context, it would be regretable to stop GIRD's momentum. This is why a second phase, whose results most probably will be much more fruitful appears totally justified, after redirecting some activities and intensifying extension.

V. Recommendations

The Proposals developed in this chapter, concern in principal, a second phase whose activities would be appreciably adjusted. It is however evident that several of these propositions with the agreement of the different parties, could be implemented immediately before the end of the first phase.

1. General Recommendations

- Abandon all and any activity which could not be extended in the short or middle run.

- Establish a Training Division - extension and regrouping of the range management and animal husbandry divisions

- Polyvalent training of the extension agents; improve their extension activities.

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- Annual and systematic drafting of a complete detailed and data-supported report (and of course, a complete report at the end of phase one).

- Drafting of a socio-economic document drawn from the observations and information gathered since the beginning of the Project

- Yearly systematic visit from a supervision mission GIRM/USAID.

- Prolong credit accorded to the peasants

- Elaboration of technical directions for extension agents

2. Agronomy Division

- Intensification of animal traction - obligation made to the owners of animals or to their representatives to participate directly in the training

- Limit or abandon non-demonstrative trials and intensify the extension of simple improved techniques.

These propositions are general; the detailed recommendations will come from the Agriculture Directorate.

3. Nature Protection Division

- More intensive extension of neem seedlings planting in the villages.

- Establishment of small forest reserves(less than 1 ha) fenced, near truck-farming gardens.

- Development of fire breaks outside of Project sites.

- Other recommendations will emanate from the Nature Protection Directorate

4. Range Management Division

- Abandon stocking-rate trials

- Creation of 3 similar herds, in the Katamanghe, for demonstrations and feed supplement trials. (incidentally, constituting a control herd in a village is essential)

- Resumption of feed supplement trials, with all the agricultural by-products available and complemented with mineral blocks, for demonstration and/or economic justification calculation.

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- Intensification of Sorghum stalk harves and diverse by-products (attached to expanded use of carts for transportation).

- Improvement of stack silos or pit-silos trials

5. Animal Husbandry Division

Observations on DIZ herds composition and of different zootechnical parameters.

- Extension of phenotypic selection and herd management

- Extension of use of mineral salt blocks and/or bone meal. Emphasis on the importance of mineral supplements

- Observations on marketing and eventual research for improving it

- Research on improving the use of leathers and hides

- Data gathering of milk production from Project herds and if possible, from the control herd

- Development and/or improvement of family poultry farming

- Improvement of extension training

- Intensification of sanitary interventions

ANNEX

DATA RESULTS OF GIRD's ACTIVITIES

ANIMAL HUSBANDRY AND RANGE MANAGEMENT

DIVISIONS

A. Animal Husbandry Division

I. Sale of veterinary medicine effected within the DIZ.

- Anabot	45,800 doses
- Berenil	43 small bags
- Amprol	10 small bags
- Estolon	5 bottles
-Exhelm 750 mg	213 tablets
- Vadephen 125 mg	850 tablets
- Vadephen 600 mg	137 tablets
- Thibenzole 10 g	63 tablets
- Thibenzole 15 g	23 tablets
- Terramycine 5 H	12 bottles
- Novar	sold but not data

These drugs were sold from May 1981 up to now. The animal husbandry division does not possess any verifiable data before May, 1981. The Chief of Party claims a total sold worth: 432,870 UM.

No figure was provided for the use or sale of mineral salt blocks weighing 14 kgs, coming from Dakar, worth 600 UM each.

II. Products used for the animals on the site.

Vaccines:	
- Anabot	1300 doses
- Tissu-peste	1300 doses
- T-1	1300 doses
- Carbo-sympto	1300 doses
Dewormers:	
- Exhelm	462 tablets
- Vadephen	700 tablets
- Thibenzole	1270 tablets
-	
Antibiotics:	
- Dystricilline	29 bottles
- Oxytetracycline	5 bottles
- Tenamycine	4 bottles
Other:	
- Veto-antidiar	55 small bags
- Gamatox	75 small bags

- Berenil	25 small bags
- Alcool	10-100 m P bottles
- Aureomycine 1%	7 tubes

III Built Vaccination Corrals

- Kiminkonnon Corral
- Katamanghe site corral, (which serves also the surrounding villages)

IV. Katamanghe site

Total surface = 550 ha
Surface for animal husbandry: 480 ha, divided in 4 blocks A,B,C,D (the latter protected)
Each block is divided in 4 sub-blocks of 120 ha each

The outside fence (9 km) of 5 strands of barbed wire, was in place before the 1980 rainy season

The inside fence (4.3 km) was placed after the 1981 rainy season

The electrical fences (9 x 1 km) have been tried without much success, (shorting out and penetration by small ruminants protected by their fleece

Laying fences required 8 to 10 laborers and 2 masons - 15 x 400 m rolls and 60 poles were set every workday.

Fence cost: 80 UM linear meter

V. Katamanghe's animal stock

- A Block: 38 cattle
  34 sheep

on natural grazing range, to a rate of 0,1 UBT/ha

- B Block - 25 cattle
  28 sheep
  16 goats

on natural range, to a rate of 0,2 UBT/ha, supplemented with sorghum stalks.

- C Block - 33 cattle
  62 sheep
  68 goats

on natural range, to a rate of 0,3 UBT/ha feed supplement in case of necessity

VI. Zootechnical parameters recorded on the site

1. Births

Global rates: Cattle 11%
Sheep 94%
goats 72.4 %

Over one year (from 11/80 to 11/82): 71 lambs, 41 kids - (figures provided by the range management division)

1. Mortality

Global rates: Cattle none
Sheep 22.7%
Goats 17.2%

- Over a period of one year (from 11/80 to 11/81)

7 lambs - 12 kids- 2 ewes - 4 she goats
(figures provided by the Range Management Division)

3. Abortions: Cattle none
Sheep 22.7%
Goats 17.2%

VII. Lending conditions for the animals onsite

- Feeding and watering - provided by GIRD
- Follow-up on animals' health
- vaccination and deparasiting
- replacement of dead animals by the Project
- Free access to the owners to come see their animals encouraged
- At experiments end, the animals will be returned to their owners

VIII. Structure of the Guidimaka cattle herds

Figures gathered by the GIRD when vaccinating herds within the DIZ
Calves from 0 to 6 months are not taken into account

Moorish herd	Cows 50.16%	1231
	Oxen 17.64%	433
	Heifers 20.74 %	509
	Calves 11.45%	281
Peulh herd	Cows 51.9%	3184
	Oxen 19.61%	1203
	Heifers 19.74%	1211
	Calves8.72%	535

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Soninke herd:	Cows 49.44%	2512
	Oxen 17.79%	904
	Heifers 21.25%	1080
	Calves 11.51%	585
Total:	Cows: 50.68%	6927
	Oxen 18.58%	2540
	Heifers 20.48%	2800
	Calves10.25%	1401

In fact, if one has 1401 live calbes from 6 months to 1 year, one could estimate that the total birth of calbes born within the year at about 4,000, and the amount of calves present in the herd at 2900. The true composition of the Guidimaka's herds would then be:

Cows 6927	45.67%
Oxen 2540	16.75%
Heifers 2800	18.46%
Calves 2900	19.12%

Which amounts to the traditional norms in the Sahel. Fecundity rate would then be 57.74%.

Within the Guidimaka DIZ it was estimated that:

Peulhs own 44.4% of the bovine livestock
Soninkes own 37.4% of the bovine livestock
Moors own 18.2% of the bovine livestock

A survey on 4 Peulh herds, 4 Soninke hers and 3 Moor hers (approximately a total of 482 bovine heads) provided the following parameters.

Fecundity rate:	62%
Mortality rate-from 0-6 months	36%
Total Mortality rate	25%

Staff of the Animal Husbandry Division

1 expatriate, 2 Mauritanian counterparts, 1 assistant, 5 extension agents, 15 shepherds, 6 permanent laborers.

To this one must add the volunteer villagers in training who are receiving the following education:

- vaccination
- wound treatment (basic first aid)
- deparasiting
- use of antibiotics and trypanocides
- study of certain clinical cases (diarrhea, marnites, constipation, bloating, horses colic)

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- notions of management: orders, recording and accounting of the products and materials in stock, such as Burdizzo castrators, lancets, forceps, scissors, suture needles, methylene blue, cotton wool, syringes, thybenzole, vadephen, exhelm, healing and antiseptic powders, insecticides for external deparasiting.

Duty of the Volunteer Villager

- to perform small routine interventions
- to assist regional staff during vaccination operation
- to supervise and inform the herders
- to warn the Chief of Division of anything which is not routine/suspicion of a contagious disease, etc.

B. Range Management Division

Material and Trials Conditions

Three herds on the Katamanghe site. According to the expert, the initial composition of the herd was as follows:

A Block 10 heifers, 1 bull - o,1 UBT/ha
13 ewes, 1 Ram

B Block 11 heifers, 12 bull calves
13 ewes, 1 Ram
9 she goats 1 goat

0,3 UBT/ha, chaff supplement

C Block 15 heifers 16 bull calves
29 ewes 1 Ram
37 she goats 1 goat

0,3 UBT/ha supplement by concentrate

According to the expert, as far as quality goes, the animals are standard. Each dead animal is replaced to maintain the stocking rate. (on the other hand the actual stocking rate is superior to the initial one)

The stocking rate, also, varied according to the season. The supplement was provided during the rainy season.

One can see that the overlapping of several factors will be detrimental to the analysis of the results.

II Results

1. Cattle

Results from one year (11/80 to 11/81)

Births and mortality have already been described in the Animal husbandry chapter. The most interesting results concern nutrition and the animals' weight.

- Weight losses, during the eight dry months were figured at 1,9%

- Weight losses in July, when rain first appears (which rots straw) until the growing of the first grasses, were figured at 3%. This loss could be overcome by a supplement with concentrates, to the rate of 50% of the energetic needs.

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- The optimum stocking rate during the rainy season would be 1,34 UBT/ha

The presentation and analysis of the other results is slightly delicate, several different parameters intervening; also the herds are not identical.

GLOBAL EVOLUTION

- A Block - (natural grazing circuit, 0,1 UBT/ha: 500 kg. gain in 1 year)

- B Block - (natural grazing circuit, 0,2 UBT/ha supplemented with green sorghum in stalks then with Brachiana hay, from February till July): 1.650 kg gain in 1 year)

- C Block - (natural grazing circuit, 0,3 UBT/ha, concentrates from February to July): 3000 kg gain in 1 year)

- On A Block, weight constantly went down (with a more brutual drop in July until the rainy season when fattening compensated and went beyond the losses.

- On B Block, weight remained essentially equal with lack of supplementation, 400 kgs from February's end to the end of July, and of 1250 kgs from the beginning of the rainy season to November.

- On C Block, weight constantly increased: 400 kgs before supplementation (quite surprising), 1.100 kgs from the end of February to the end of July, with concentrates. 1500 kgs from the beginning of the rainy season to November.

WEIGHT INCREASE EVOLUTION IN PERIODS

FEBRUARY 24 to MAY 25

BLOCK	SUPPLEMENTATION	TRUE WEIGHT GAIN (KG)	RELATIVE WEIGHT GAIN OF THE HERD (KG)	OPERATIONS PROFIT (UM)
A	none	-175	0	0
B	1850 kg of green sorghum stalks 23/kg/day	+750	+982	21,500
C	2772 kg of Concentrate 36 kg/day	+675	+1.119	40,194

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One has to modulate the profit of the supplements with concentrates. As a matter of fact, this concentrate was bought duty-free and the cost of transport is not included. On the other hand, the price of the stalks was retained at its highest price (10 UM/kg). Never-the less the supplements are economically interesting, the major obstacle being that they require an investment on the herder's side. Sorghum stalks only require being picked up though necessary to use a cart).

Stalk analysis, performed by the "CNERV" showed 0,5 E/kg of dry matter with 9-10% N. 23 kg/day were distributed to B herd, covering 20% of their needs in energy and 25% of their needs in protein.

The figured gain of 0,529 of live weight per kilo of stalk appears to be surprising and needs to be checked.

PERIOD OF JUNE 26 TO JULY 20

BLOCK	SUPPLEMENTATION	WEIGHT VARIATION
A	none	-75 kg
B	30 kg/day Brachiania hay	-200 kg
C	36 kg/day concentrates	+ 200 kg

Distribution of concentrates still proves itself worthy of interest, and covers 50% of the Energy needs. On the other hand, Brachiania hay reveals itself very disappointing.

Harvest was done August 1980, and analysis at the CNERV showed: 0,51 E/kg of dry matter with 3,8 % N, thus covering 22% of energy needs. Five tons of hay (estimated weight) were thus available after cutting 3 ha with a sickle. 6 Kgs. of Brachiania cost about 8 UM/kg.

Sasbania hay is better. It can be harvested green till the end of September since its cycle is longer than Brachiania's. Analysis shows 0,5 E/kg of dry matter with 9% N. But harvesting is harder and costs about 44 UM/kg. which is prohibitive.

2. Small Ruminants

The analysis of results of small ruminants is even harder in light of the fact that feed supplements were given to both herds, sheep and goats mixed, and also because births kept interfering with the weight gains. Supplemental feeding was effected from 3/23 to 7/20.

- B Block: from 3/24 to 5/25: 10/kg/day of sorghum stalks, from 5/26 to 7/20: 15 kgs/day of Braichiania hay

- C Block: 14 kg/day of concentrates

WEIGHT GAIN RESULTS

BLOCK	WHOLE HERD (SHEEP)			EWES ONLY		
	2/24	5/25	7/20	2/24	5/25	7/20
A	640	725	670	570	480	440
B	595	660	595	555	525	440
C	1.180	1340	1340	1.090	1.020	965

It seems that supplemental feeding even with concentrates does not bring any tangible results on weight. However, these results, for reasons stated above, must be considered with the most extreme caution.

C. Other Divisions

The figures given for those divisions were presented by the team members during the course of the evaluation. They are but fragmentary, the concerned divisions having gathered their own figures and detailed results.

1. Agronomy

- Variety selection: Tangible increase (double on average) of the productivity of the selected varieties (sorghum, niebe, ground nut) with the exception of the millet and maize varieties.

- Cultivation techniques: Scarifying the soil is inefficient Scarifying followed by plowing increases productivity 15%.

- The optimum spacing between rows is 1 m.

- The traditional association sorghum-niebe proved itself to be the best.

- Results observed within the DIZ, after plowing and implementation of already proved improved cultivation techniques=

SELIBABY - Output increase on three fields
+27% + 32% +90% average = +49.6%

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DANGUERIMOU -	+ 56%	+70%	+48%	average = +58%
DIALA =	+42%	+20%	+60%	average = 49.4%

General Average = + 49.4 %

One has to take into account that in Soufi and Goumba N'Dao, no results were recorded (incompetence of the extension agents)

Seed Production = 2.050 kgs of sorghum

PRICE OF ANIMAL TRACTION MATERIAL

Plow	7,000 UM
Horse cart	16,500 UM
Bovine cart (small)	17,000 UM
Bovine cart (small)	19,610 UM

2. Nature Protection

Beyond the protected Katamanghe site, described before, two other protected sites were implemented:

SINGHA: Original site, implemented in 1980, 5 ha, 1,3 km of fencing, wire mesh and barbed wire. Second site implemented in 1981, 10 ha, 1,3 km of fencing, wire mesh and barbed wire.

NIAROUWALLE: implemented in 1980, about 20 ha, 1,8 km of barbed wire fencing

Seedlings Production

In 78/79	8,000 seedlings
In 79/80	500 seedlings
In 80/81	30,900 seedlings
Total	39,400 seedlings

Sites reforestation - 50% to 60% recovery rate preserve of a 15 ha forest in the Katamanghe.

Firebreaks - implementation of 10 m wide fire-breaks around the sites. All in all about 13 kms.

D. Private conversations with Peasants

The report of these conversations does not in any way claim to reflect the DIZ peasants general opinion, only about ten peasants partook in the conversation.

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1. In Selibaby - The peasant confirmed, by hints, the actual weakness of the range managment and animal husbandry divisions impact; only the sight of a cesarean really impressed them.

- Truck framing is now of real importance to them.

- But, draft cultivation was at the center of every conversation. One peasant claimed having multiplied by three, the surface of his crops, while improving vegative growth. He estimates his harvest was tripled, that weeding speed was multiplied by eight.

He also estimates that one week of work with five men, by draft cultivation is equivalent to three weeks work with five men, in traditional cultivation, and that in five hours of plowing, the work of three traditional days has been done. Finally he feels that soils known to be unproductive become productive after plowing, since he experimented with it himself.

Another peasant recognized doubling his fields surface, thanks to draft cultivation. Work becomes easier but he could not give any data.

2. In Coumba N'Dao - Representatives of the Cooperative came to converse with the evaluation team members. The cooperative is only agricultural, even though its members (52 in the region, 22 in France) hold 300 cattle and 100 small ruminants. Two teams of trained oxen belong to the cooperative, but no peasant totally followed the training and none feels able to train a team of oxen.

The village has now three trainers provided by the GIRD.

The peasants main concerns, about their animals are: medical care and nutrition.

For Medical Care: Drugs are available in Selibaby but no one according to them, ever came to take care of the animals. The extension agent (recognized incompetent by the GIRD AND FIRED since) was only seen once by the peasants, in one month when vaccination occured. Thus they wish more intensive medical care for their animals and a genuine extension.

For Nutrition: The peasant showed themselves very reticent on the establishment of grazing reserves because of evident financial constraints. On the other hand, they are very much in favor of the supplemental feeding with sorghum stalks and already practice it in a small way. They are convinced of the importance of this supplemental feeding and all the members of the cooperative have stored stalks to the limit of their possibilities - (between 1/6 and 1/12 of the cultivated surface). The cutting of stalks is done right after the harvest - they are covered with thorns (protection against animals) while waiting to be transported and stocked in the villages.

They give the stalks at the end of the dry season:

1 - to the "case" animals

2 - to the weakest animals

Two major constraints exist for more intensive stalk collecting:

- Discord in the village = one peasant in order to vex some, according to them, does an earlier harvest and lets the animals enter his field, animals who then, destroy the other fields.

- Lack of carts for transportation.

Finally, leathers and hides are not used (except eventually to make prayer mats). The local cobblers take for free the leathers and hides they need to make shoes, hats, bags, gris-gris etc.

ANNEX E

31 March 1982

Range Management/Livestock Evaluation of the Integrated Rural Development Project-DRIG
17-22 February 1982 - Rudolfo Griego, USAID/Mauritania

Evaluation of the Integrated Rural Development Guidimaka Project was undertaken by a team representing several disciplines and interests. Each member, or group of members, addressed the element of the project relative to his expertise. This report addresses the Livestock and Range Management Program of the Project.

PREFACE

The fifth Amendment to the Original Project stated the need for experimentation and demonstration of improved Livestock technology, and the extension work necessary to promote new and accepted practices. This amendment also proposed grazing trials and supplemental feeding studies. Also included was an element of animal health interventions which were to be "limited" to assisting the Mauritanian Government Animal Health Service with vaccination and de-worming, and a system of supplying veterinary drugs on a sale basis.

Evaluation of the activities included an objective view of work conducted in the Livestock and Range component of the project, appropriate comments on various aspects of the work, and recommendations for any future activities.

Range Management

Work thus far completed by the Range Management Specialist during his relatively short time on the project has been of mixed consequenses in the areas he has chosen to work. It must be noted that the highly professional attitude of the individual involved has been a definite asset to the Project.

Results of the studies to date, because of the relatively short duration of data gathering, cannot be adequately evaluated or interpreted. Also, these data cannot be construed as a basis for establishing management goals or objectives. Considerably more time and data are needed to arrive at a sound basis for justifying

any attempts to develop a grazing system.
Results, for example, which cite a Bovine gain of .5 kilograms for every 1 kilogram of fed concentrate, would be highly suspect and definitely in need of verification. Furthermore, the supplemental feeding of herds in the grazing trial units, as was done, would yield incorrect carrying capacity data and could not be applied in a grazing system determination. Data of these kind would serve the purpose of measuring animal gain in relation to type of concentrate fed to a grazing animal, and would be extremely useful if supplemental feeding was normally practiced. The water catchments visited during the evaluation must be commented upon. Undoubtedly, considerable thought went into designing the structures. Yet, important aspects such as soil porosity, geological features of the sites, and evapotranspiration rates of the structures played a minor role in the planning process. A more indepth study of this endeavor would have eliminated the problems now faced with actual digging, and with water loss due to infiltration and evapotranspiration.

Development of water catchments, though the need cannot be stressed enough, has been an undertaking that cannot be replicated by the population. Financial constraints exist and manpower and expertise to develop enough of these catchments in order to have an impact on the livestock industry are lacking. This endeavor I would relegate to a purely experimental idea which is premature in nature.

The introduction of forage species will show what speciea can and will grow: and, over time, which species will readily adapt to an area. To say that the population is willing to accept the introduced species and promote range reseeding is an assumption that must be tested. Again, the practice of range reseeding connotates vast expanses of land, and in the case of the Guidimaka area, land under variad ownership. It also connotates fencing for protection and development of grazing systems.

The work undertaken by the Range Management Specialist has been largely one of fundamental range research, with little applied

range practices. Yet. the route taken to meet, in part, the project goals has been a prudent one which does lead to tangible results.

Range Management has been falsely regarded by the conceivers of the project to be something that can be "applied" over a period of five years or less. Range Management must be developed over long periods of time, this is the case in a fragile ecosystem such as the one being dealt with. To foster the "short duration" idea, that a grazing system can be developed in any region of a country bound by strong social, political and economic constraints, is indeed to be unrealistic.

It was made clear in the many discussions held, that the idea of fencing anything larger than two or three hectares was out of the question, for reasons cited above. The small areas readily agreed to were for the purpose of forage production and harvesting, which of itself, is not range management.

Livestock

Livestock health was treated with an inflated importance in relation to the position stated in the project paper and subsequent amendments. The primary reason for this was the introduction of a highly competent and visible expatriate veterinarian. This new element brought to the project is not one that can necessarily be repeated, most especially in a position calling for an animal husbandryman. In essence, the Project focus seems to have centered on animal health related activities and animal nutrition of a harvested-and-fed type as a supplemental to grazing. On the other hand, it has also demonstrated the need for a fulltime practicing veterinarian.

The health and nutritional program afforded the project animals is what is desired for the livestock of the region. In short, an excellent example has been developed to demonstrate sound animal husbandry practices.

In reality, I feel that a cost benefit analysis of a supplemental feeding program and an intense health program, carried out

on a continuous basis would yield uneconomical results.

Emphasis on a health program must be undertaken, and supported by the Mauritanian Government. The project has only shown the results of such a practice.

The rational exploitation of the existing forage base, based on animal grazing would keep the economic balance in a more favorable state. What is being obliquely proposed by the project is a mechanized and highly technical endeavor in order to be able to adequately supplement the large numbers of livestock in the Guidimaka.

CONCLUSIONS AND RECOMMENDATIONS

The livestock and Range Management component of the DRIG Project was conceived primarily as a demonstration activity to show the farmers and livestock owners the effects of grazing at different intensities and the effects of health practices.

The principles shown in the demonstrations and examples are known by the individuals targeted, although the work amplifies on the need for incorporation of these practices into the daily routine of livestock management. The livestock owners are well aware that a fewer number of cattle on a particular field means more vegetation for each animal and, therefore, the likelihood of more gain per animal.

The population is also aware that they can better manage their livestock by using fencing of one type or another. But, they are not able, financially or man-powerwise, to construct the enclosures.

The harvesting of hay for feeding livestock is important, but as such, is not an objective of range management as much as it is a feedlot operation... animal nutrition in a pure sense.

Range Management cannot serve the farmers or livestock owners until there is a means of delineating the grazing pastures,

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forming a means of controlling herds, and thus instituting a grazing system in the Guidimaka. The project element of grazing management can only serve as a demonstration of what can be done.

Any further activities in Range Management should be considered carefully. The research approach would yield information that can be used at some point in time; again, one must consider the time needed to obtain useable data. Applied Range Management must be done with the concurrsnce of the people of the area, their complete cooperation; but, before this can happen, the other major obstacles mentioned in this report must be overcome.

Activities in Livestock Health must be looked at with the idea that replication of the practices can continue once the project is terminated. Unless the Government of Mauritania is willing to commit itself to the continuation of the demonstrated health practices, any further continuation would only serve to prolong an eventual disappearance of the practices and a decline to the conditions originally found.

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ANNEX F

Report on the - Small Projects of Communal Infrastructure

By Wone Abderrahmane, Chief of Party, GIRM (original text in French)

The SPCI idea through its concrete objectives answers in a general manner the true needs of the region's population. The G.I.R.D. Project attempts, by sensitizing and animating, to convince the collectivity to react to the communal needs. Often the needs are obvious, but the interested parties do not react. The true constraints are difficult to fathom.

The G.I.R.D. Project proposed to participate in 32 Communal actions during its span of life, i.e. Before December 31, 1982.

The direct intervention zone (D.I.Z) covers a population of 20,000 distributed within a 20 km. radius around Selibaby. We draw attention to the fact that we have already started, with the agreement of the highest regional authority to contact some the population outside of the D.I.Z.

We have already undertaken 33 Small Communal projects inside and outside of the DIZ.

List of the projects

1 Mbekere	1 room school
2 Mbekere Saloum	1 well
3 Koumba NDao village	2 wells
4 Koumba Ndao Cooperative	1 well
5 Diegui	1 room School
6 Dialla	1 well and basin
7 Bouroudji	1 well
8 Soufi	2 room School
9 Lewara	1 well
10 Toumiatt	1 well
11 Mbaedia Hamague	1 well and basin/trough
12 Nahasse	1 well
13 Hamdallaye	1 well
14 Dangueremou	1 well and basin
15 Kininkoumou	- vaccination corral
16 Bambaradougou	1 well
17 Tamourt	1 well
18 Selibaby-new neighborhood	1 well (near Hospital)
19 Public garden fence	-
20 Saboussire	2 room School
21 Sanga Dieri	2 room School
22 Wompou	- Repair of 2 room School
23 Wompou	2 room School
24 Diarabe	1 well
25 Hassi Chaggar	1 well
26 Mbaedia Sakha	3 room School

27 Tec Tak Samba Ngoma	2 room School
28 Ould Yenge	3 room School
29 NDoumelli	1 room School
30 Kali Nioro	2 room School
31 Harraf	2 room School
32 Melgue	1 room School-Work begun (GRDR)
33 Korokoro	1 well (war on want)

Let us note that the G.I.R.D. must not participate over either UM 50.000 or 25% of the cost of the Communal project. At the same time though, the Project tries to do its maximum for the population.

Working out cost and participation is always done by common agreement between the population and the G.I.R.D. project's technicians.

Often, it is the Chief of Party (AID) Dr. Max Goldenshon or the Chief of Party (GIRM) Assistant Engineer, Wone, who takes the Small Project in charge, and thus works out the cost and the division of responsibilities.

The actual work only starts when there has been a common agreement on the responsibilities.

In general, both parties do observe their commitments; the have been some exceptions, on the order of 5%.

Sample Calculation

A) Selibaby Bambaradougou (Projet) Expenses

Cement 40 bags x 400 Um	16.000
Iron Rods 1T x 5000 Um	5.000
Iron Wire 10 packs x 120 Um	1.200
Rope 90 m x 20 Um	1.800
Buckets 2 x 600 Um	1.200
Pully 1 x 1400 UM	1.400
	26.600 UM

B) Figure cost of Digging (Population)

Transport-sand
Transport-gravel
Transport-water
Forms
Wooden forks
Digging (Biggers and Team) Total of 5 000 Um/meter
The well reaches 16 m - 16 m x 5000 = 80.000

SPCI is perhaps the most popular of GIRD's actions because it solves the problems chosen by the local population itself and approved by the highest Regional authority. It is a part of GIRD where the population is forced to recognize communally it own urgent needs and arrive at solutions to some of those needs.

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The value of this process in stemming the rural exodus and opening populations to GIRD's other facets is almost immeasurable.

ANNEX G

GUIDIMAKA INTEGRATED RURAL DEVELOPMENT PROJECT

EXPERIENCE, INC.

B. P. 91

SELIBABY - MAURITANIA

PRELIMINARY PROGRESS REPORT

AND

QUARTERLY REPORT

Dr. Max D. Goldensohn
Chief of Party, CI/ID

15 January 1[illegible]

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PRELIMINARY PROGRESS REPORT

This is the report required in article 1 paragraph C, page 4 of the contract between Experience, Inc. and USAID, signed on September 24, 1981 by Robert A. Delemarre and M.H. Snyder for the execution of the Selibaby Integrated Rural Development Project (682-0201) in Mauritania. This report is also the first of the quarterly reports required under that same article of the contract. The next will be submitted soon after the end of the first quarter of 1982. As requested, this report will present :

1° - An overall statement on the Projects progress in research and in increasing production among the farmers and herders of the Guidimaka ;

2° - A report on progress to date by major task according to the PP amendment of May 1981, as reproduced in the above-mentioned contract between Experience, Inc. (EI/DC) and USAID ;

3° - A discussion of remaining constraints - economic, social and technical - which influence rural development possibilities in the Guidimaka ;

4° - Propositions for overcoming these constraints ;

5° - A set of questions that the contracting team feels should be posed during the evaluation of February 1982, which replaces that of December, 1981 ;

6° - A proposal for permitting the analysis and presentation of the data and information gathered by the Project sociologist during his stay in the Guidimaka.

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PART 1 - OVERALL STATEMENT ON PROGRESS IN ACHEIVING PROJECT GOALS

The goals of the DRIG Project are simple : to develope and begin extension of innovations in agriculture, range management, and animal husbandry that are technically feasible, economically viable, and socially acceptable in the Guidimaka Region of Mauritania. The purpose of the Project is to increase agro-sylvo-pastoral productivity in the region and to help diminish the rural exodus from the Guidimaka. To this end, the Project has developed a research strategy and a modified extension plan (on-farm trials, in AID language). Subsets of specific aims in each of the above-mentioned fields have also been developed and are presented in the PP amendment of May 1981 and in the contract between EI/DC and USAID. I shall analyze our progress toward accomplishing these goals in the next section of this report. Before presenting this detailed analysis of our progress to date, however, I feel that a short resume of the history of the Project and of some of the problems we have had to face in getting to our present position is in order.

The Guidimaka Integrated Rural Development Project was the first major rural development effort planned, funded, and started up by USAID/RIM. Indeed, it was the first major project of any kind executed by USAID in Mauritania. This has led to many difficulties in execution, since AID hat not developed appropriate administrative, financial and technical systems to back up an effort like the DRIG in an area as remote as the Guidimaka. Thus the Project has had to break new ground in nearly every aspect of its operation, from the first days of its life. As the DRIG remains the major rural development effort of AID in Mauritania, the problems of breaking new administrative ground continue to plague us as the end of the first phase of the Project approaches and decisions must be made about whether or not to continue the activities begun by the DRIG.

One of the first consequences of being the first Project begun by AID in Mauritania, was the slowness of the approval and funding process. The first study teams went to the Guidimaka in 1973 and ever since, the people of the region have expected immediate action and tangible results from USAID in their area. Their expectations were not fulfilled, of course, since the

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original Pro-Ag was not signed until September, 1977. The original contractor, Pacific Consultants of Washington, DC signed a contract to do the Project in September of 1978 and by January 1979, they had signed on a complete team with the exception of a range management expert. Nonetheless, because the housing was not ready and because a bilateral agreement between Mauritania and the U.S had not been approved, the first members of the project team did not go to Mauritania until April of 1979, when work on Project tasks finally began.

Even then, work began very slowly, because the state of the housing provided for the technicians was such that the first Project mechanic and the first animal husbandry expert only came to the field in August of that same year and the first agronomist did not come until January of 1980. Pacific Consultants finally recruited a range management expert and sent him to Selibaby in August of 1980. Of course, all the problems encountered in the Early phases of the project were not AID's fault. Pacific Consultants turned out to be a difficult and unreliable company, whose contract was terminated for the convenience of the American government in November 1980. Their mechanic and agronomist were incompetent and had to be fired and their animal husbandry expert though competent, was unhappy in Selibaby and left the team in December of 1980. Pacific's inability to pay the team regularly and to provide money for expenses in Mauritania led to serious morale problems on the team, which culminated in a collective offer to resign if something was not done about the situation by AID.

When Pacific Consultants' contract was terminated by USAID, Experience, Inc. received the task of administering the Project and of completing the team of expatriate technicians.Since EI's arrival on the scene, there have been no problems between the field and our home office. Financial, administrative, and technical support have arrived when needed and new, competent technicians have arrived to complete the team in the field.

While all these problems with the USAID and Pacific Consultants were retarding the execution of certain phases of the Project, the Mauritanian

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government (GRIM) was carrying out its obligations to the project quite conscientiously. The counterpart team is now at eight full-time technicians and in general, the Ministry of Rural Development has responded promptly to our personnel needs. Three counterparts have left the Project : one for a more research oriented assignment, which he preferred ; one to enroll in the ENFVA at Kaedi ; and one for personal reasons. They have been effectively replaced and on the whole, the counterpart team has grown correctly in response to Project needs.

The GRIM also undertook to provide, through the Guidimaka's peasants and herders, sufficient land and animals for the experimental aspects of our program. This has also taken place. The Project currently uses : an office site of 50 m x 100 m on land officially ceded to the Agricultural Sector of Selibaby ; a 1.5 hectare nursery/market gardening site on land also ceded to the Agricultural Sector for our use ; a 500 hectare range/animal husbandry/agricultural site - Katamangue - ceded to the Project by the traditional owners in the village of Selibaby ; a 20 hectare range/forestry/agricultural site - Niarwale - on land ceded to us by the traditional owners in Bambaradougou Village. In the latter three cases, the owners have agreed that the land be used by the Project or the GRIM for as long as either needs it. Afterwards, the land and all improvements on it will go back to the original owners. In addition, the herders in the Direct Intervention Zone (ZID) have lent the project sufficient animals for our experimental herds on the Katamangue Site and for control herds in the ZID. In villages where the Project conducts on-farm-trials, villagers have lent us land for demonstration fields.

The problems that we have had with the GRIM have been limited to those stemming from the rapid movement of officials into and ou of the Guidimaka, a movement which has recently slowed down significantly. The Ministry of Rural Development has not replied regularly to correspondence or sent us observers and visitors as much as we might have liked, but they kept us informed of their opinion on Project activities through meetings with Project personnel on TDY in Nouakchott.

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In spite of the problems listed above, I feel the Project has made excellent progress toward the accomplishment of its goals. We have discovered through research on our sites, literature searches, and discussions with experienced Guidimaka development personnel, innovations in all the domains in which the project works, which merit extension to the people of the Region. We feel these innovations meet the technical, economic and social criteria posed by our mandate. Some of our research programs have not reached fruition because the personnel charged with carrying them out have not yet had the time in the field they need, but they are already showing promise which we hope will be fulfilled in the future. We have conducted on-farm-trials for many of these innovations and are planning to begin further activities of this nature during the 1982 dry and wet seasons. Current indicators predict as good success for these new programs as for the old ones which we shall extend to an ever larger group of pilot farmers.

PART 2 - PROGRESS TO DATE ON THE MAJOR TASKS ACCORDING TO THE PP AMENDMENT OF MAY 1981 AND THE CONTRACT BETWEEN EI/DC AND USAID

The scope of work section (Article 1, part B) of the contract between EI/DC and USAID presents a list of tasks which the contractor (EI/DC) must carry out to satisfy its obligations under the Contract N° AID/afr-0201-C-00-1012-00. I shall deal with these requirements in the order in which they are presented in the contract. After this, I shall present other accomplishments of the Project.

1° - Provide technical services and procure commodities necessary to accomplish the work required : EI now has in the field an experienced and competent team of linguistically and technically qualified agents :

- Agronomist : Quan Minh Doan, from February 1981, agronomic engineer, fluent French and English, 25 years of relevant experience.

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- Range management : Greg Greenwood from August 1980, MS in Range Management, fluent French and English, 6 years relevant experience in the Sahel ;

- Animal Husbandry : Duane Schaad, from October 1981, Veterinary Doctor, fluent French and English, no professional overseas experience, but 17 years in Africa as a youth ;

- Mechanic/Administrative assistant: Jean Varenne from October 1979, appropriate technical certificates from French Army, fluent French, adequate English, 25 years appropriate experience in the Third World ;

- Administrative/ financial assistant : Paul Guenette, from January 1979, BA, fluent French and English, 6 years relevant experience in the Sahel ;

- Chief of Party : Max Goldensohn, from November 1978, PHD in Social Anthropology, fluent French and English, 17 years relevant experience in the Third World.

2° - Procure commodities necessary for carrying out Project activities : Experience, Inc. has proved itself exceptionally swift in finding, buying and shipping supplies from the US and Europe to Nouakchott. Their logistics officer, Robert Locke, keeps close track of all requests for commodities and monitors the progress of all orders until they reach their destination. Materials have so far arrived quickly and in good condition. In its turn the EL/RIM team, ably complemented by Mohammed Ould Salleh and Paul Bernard, has regularly been able to find most of the commodities we need in Nouakchott and Dakar and has established an efficient system for sending them without damage to Selibaby. The only crimp in the system has been the necessity of passing through AID's slow and inefficient PSD division for Purchase Orders and PIO/C's on large local orders.

On page 4 of the above-mentioned contract, there is a list of commodities to be procured :

a - D-6 type bulldozer : now in Nouakchott for overhaul and an operator is in training ;

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b - A 7 T truck was supposed to have beenordered by PSD, who refused to let EI procure this item. As a result it has not yet been ordered and the PIO/C has just been signed.

c - 12 125 cc motorcycles are in the Nouakchott airport awaiting customs clearance ;

d - The 4 four-wheel-drive vehicles were acquired from the RAMS Project and are now in service in Mauritania ;

e - Three catchment basin liners have been cancelled due to excessive cost and non-replicability ;

f - Veterinary drugs and supplies are regularly procured as needed. Currently the materials for the village veterinary volunteers are being procured in Dakar and in Nouakchott ;

g - Animal traction equipment will be ordered as soon as we find a regional supplier, as our previous supplier (SISCOMA) has gone out of business. This problem is not urgent as the CCC (FAC) has brought a great deal of traction equipment into the area and sales have only begun now. There will not be a serious lack of equipment in the Guidimaka, even if the DRIG Project fails to order any more. However, since the CCC (FAC) project has not ordered any equine or bovine equipment, wefeel that we should make a small order to satisfy the growing demand for this equipment;

h - Camping equipment has been procured and is now in Selibaby ;

i - Agricultural seeds, tools and supplies are ordered as needed, generally in Mauritania or Senegal ;

j - Range/forestry supplies are also ordered as needed. We have sufficient supplies of nearly everything now, except imported forage seeds for the 1982 rainy season. These have been ordered and we await them in the near future.

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k - The 5 generators have been cancelled on the advice of our mechanic, on the grounds that our current generators can survive until December 1982 ;

l - The air-conditioners have also been cancelled as we received 10 units from the RAMS Project.

On the basis of the above summary, I feel justified in saying that EI's procurement record, both in the US and in the RIM has been more than satisfactory.

3° - Construct water catchment basins : three water catchment basins have been completed on the Katamangue range site. Dug in rocky, clay soils by hand they are not an extendable technology : they require too much manpower for too long a period for local villages or groups of villages to undertake. In addition they would be dug far from centers of habitation, in areas where there is pasture but no water. We are thus awaiting our bull-dozer to try catchment basins in the ZID. The basins on the sites held water this year from July through October, a month and a half less than last year. The loss was due mostly to infiltration, though evaporation certainly played a role. We had planned to cover the basins with plastic, but the cost rendered this operation non-replicable by villages or groups of villages and we are now trying to cement one basin. The cost is estimated at 1/6 of the cost of plastic for one basin. Dingging basins by hand costs approximately 20 times the cost of digging them by machine. We have thus no intention of extending hand-dug catchment basins in the ZID.

4° - Determination of most adaptable and productive food crop varieties : This research program on our sites has used two lines of attack. First we have, since 1979, planted fields of cereal varieties whose adaptability in the Guidimaka was well known in order to provide seed for interested farmers in the ZID. The quantities of seed produced have risen each year. We have

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concentrated on one variety of millet (Souna III), of which we shall have 800 kgs. to distribute in 1982 ; one short cycle sorghum (Sidi mieliba), which is very drought-resistant, of which we shall have 1 T 600 of seed to distribute this year ; and one variety of longer cycle, high-yielding sorghum E 35-1, of which we shall have approximately 500 kgs to distribute. These varieties are more productive than most of the commonly used local varieties, particularly when cultivated with improved techniques introduced by the Project.

The second line of attack is the testing of imported varieties of cereals, particularly sorghums, to see if they are well adapted to the conditions of the Guidimaka. This aspect of the program had its first successful rainy season in 1981. During the 1979 season, the Project had no agronomist and our fields were not determined or fenced. During 1980 season, irregular rainfall nullified the results obtained, as was the case for most research stations in the Sahel. In 1981, however, competent personnel and well-distributed, if scanty rainfall (454 mm) permitted us to test varieties from Upper Volta (SAFGRAD), the United States, and Nigeria. Sixteen varieties gave results of between 1,8 T and 4 T/hectare, while most local varieties failed because of the light rainfall. Experments with these varieties will be continued in 1982.

We have tried corn varieties from Upper Volta, but found no varieties that give higher yields than local varieties. We are thinking about discontinuing experiments with corn, particularly as the irrigated perimeters along the River organized by the SONADER are producing quantities of corn that may well satisfy local needs.

We have tried niebe varieties from Upper Volta and 14 varieties gave yields double or more those of local control species. These varieties will also be tested in 1982 for confirmation.

The SAFGRAD also provided us with striga-resistant sorghum varieties, nine of which gave yields more than double those of local control species in striga-infested fields. We shall also continue this program in 1982.

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1982 will be the third season which our original Pro-Ag called for, however, since the 1980 results were nullified by bad rainfall, we feel that a further season (1983) should be added in the hope producing more reliable results in these experiments.

5° - Demonstrations of soil management practices : These experiments were begun during the 1980 rainy season, but once again the briefness of the rainy season defeated our attempts to obtain valid results from our fields. However, in 1981, the experiments have begun to bear fruit. Thus plowed fields gave, in general, yields 15 % higher than unplowed fields next to them. Associations of legumes with sorghum indicated that peanuts would be the ideal legume for this practice, and that the local method of mixing legume and cereal seeds in the same hole gave the best results. A rotation experiment was carried out including planting different legumes (peanuts and niebe), sorghum, and nothing (fallow) on adjacent plots of land. These crops will be alternated in 1982 to test the results for the improvement of soils through rotation. Experiments in soil improvement through manuring and composting were also carried out. As expected, the results on composted and manured soils were strikingly better than those of non-treated soils, even on the degraded Hiarwale land.

6° - Introduction of animal traction : During the 1980 and 1981 rainy season, animal traction has proved its usefulness for water retention and labor economy both on project fields and in on-farm demonstrations in the villages of the ZID. Soil preparation through plowing or scraping fields and weed control have been carried out by cattle, horses, and donckeys trained by the Project for this work. We have found that pairs of bulls and single horses are the most effective and economic animals. Donkeys tire quickly and cannot pull a plow in the heavy soils of the Guidimaka. Cattle are the animals we most recommend, since they can work for the longest time without tiring, require less care than horses, and at the end of their career can be sold for meat. A cattle cart can haul 1500 kgs, whereas a donckey can only pull 500 and o horse 1 T. The Project has trained 7 pairs of bulls for itself (three have since been sold to peasants in the ZID) and 7 pairs for local farmers. At any given time, we have up to 5 pairs of bulls and several

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horses in training and receive requests regularly for this service. In 1979, as far as I know, there was no animal traction, beyond a dozen or so donkey carts in Selibaby, in the ZID. Today, there are at least 30 plows that worked during the rainy season of 1981 ; some sold by the Project to farmers, other repaired by Project technicians for farmers who had bought them years ago and had not used them for a long time. Most of these were pulled by horses as bovine traction had never been seen in the Guidimaka before our introduction of it. Next year (1982) we expect to have at least 10 peasant owned teams working, as well as the 6 project demonstration teams. In toto, the Project has sold to the peasants of the ZID 45 units of animal traction equipment, including donkey carts, horse carts, cattle carts and plows. To go with this introduction of animal traction activity in the ZID, the Project has trained 9 animal trainers who are now able to take full responsability for preparing an animal to work in the fields. They have 6 apprentices with them now, who we hope will soon become capable of training animals, too. Local wood-cutters have learned how to make yokes for cattle, and local blacksmiths have learned how to make certain repairs on carts and plows. The project depends for all its yokes and repairs on these artisans, who also serve the peasants who have purchased our equipment. We have also introduced animal traction as an alternative to pumps to haul water from wells for gardens and stock watering. We feel that pumps are injustifiable economically and ecologically.
While a regular feature of herding activity in the Trarza, for example, this was unknown in the Guidimaka before our introduction of it. Already, one peasant is watering his herds with water hauled from a well with his pair of project-trained bulls.

7° - Gardening and fruit production : Vegetable gardening has been a minor cold season activity for some Guidimaka peasants for some time ; however, irregular supplies of seeds and tools, as well as unreliable technical supervision kept the activity limited. Nonetheless, the people of the Guidimaka like to eat vegetables and appreciate the occasional extra income that this activity provides. Thus, the Project has established a demonstration garden in Selibaby and is this year supervising approximately 200 gardeners in 11 villages in the Region. Last year, the program operated in

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5 villages. The 5 centers for animal traction training in ZID villages act, during the cold season, as vegetable gardening technique training centers. In addition a mobile team backs them up and covers villages that are too far from the Centers, whose agents have no transport for the moment. The production from the project garden is either sold to Project staff or given to the hospital for patients, to the grade school dormitory for student meals, or to the PMI for nutritional demonstrations. Our two female extension agents also give demonstrations in villages on how to prepare vegetables for the table. These demonstrations are kept simple, and so far have been successful. In the demonstration garden, we also test vegetable varieties. For example, we have retained two of five tomato varieties tested. And we test cultivation techniques, such as mulching, hill and furrow cultivation, watering frequency, fertilization and composting, spacing, etc. The results of these experiments are passed on to our pilot gardeners as soon as we are confident of their usefulness.

Fruit production, on the other hand, has been discouraging so far. A project orchard was established in the cold season of 1979-80. Mangoes have failed to grow there and though citrus and guavas have survived their development has been slow. The Project agronomist's analysis of this question based on the results of the Project orchard and on observations of the orchards of local people leads to the conclusion that fruit production cannot be a major economic activity in the Guidimaka's dry culture zones. Families may certainly keep a few trees in their yards or in small private orchards for family consumption and pleasure, but large orchards simply require too much water and investment to be economically viable. So far our efforts to grow seedlings for distribution to peasants have not been very successful, though all the seedlings we do produce are eagerly purchased by local peasants.

3° - Improved cultivation techniques : The techniques that we have tested on our sites include : plowing with animal traction before planting, weeding with animal traction, early thinning, planting in rows perpendicular to the slope of the field, trimming secondary heads, earthing up around stalks, manuring, composting, proper intervals between plants and rows, etc. In several cases,

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such as the last on the preceding list, the normal local practices have proved the most efficient and thus no extension plans have been made. In other cases, such as early thinning of millet and sorghum fields to two or three stalks per hole, local practice has proved less efficient and an educational campaign has begun. The team of Project agronomists have found that these innovations are extendable with close supervision and encouragement, but that if mistrust develops between the farmer and the project agent for any reason, the farmer returns to his traditional patterns. This is why we have insisted on working intensively with a small number of farmers in our first years of on-farm trials.

9° - On-farm-trials : I have discussed the on-farm-trials of vegetable gardening techniques above, but the main thrust of our on-farm trials has been in cereal culture. The rainy season of 1981 was the first year that we had the authority and the personnel to conduct such trials. To this end, we have established Animal Traction and Improved Cultivation Training Centers (CFTA's) in 5 villages in the ZID. Each center is staffed by a Project-trained extension worker, as well as an animal trainer and an assistant animal trainer. These workers live in the villages chosen as centers. Each of them covers at least two other villages as well as the village of residence. Last year, they identified approximately 25 pilot farmers who agreed to follow a precise program of improved agriculture including animal traction and improved cultivation techniques. In addition, the extension workers supervised the fields of as many peasants as possible to teach them those techniques that seemed appropriate. In general, the animal traction this year was done with Project animals as a demonstration, however, around 20 % of the pilot peasants supplied their own animals and others used them under project supervision without being pilot farmers. We estimate that we thus improved the yields of approximately 500 farmers through one sort of advice or help or another. We also distributed Souna III seeds and Didi Nieliba seeds from the 1980 harvest, although quantities were limited, since the year was not a good one. These seeds are highly appreciated and much in demand.

The preliminary results of the 1981 rainy season indicate that pilot peasants improved their yields by between 50 % and 300 % over the yields of control

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plots on similar soils nearby and all report great differences between this year's harvest and last years. With animal traction for plowing, land that recently had not been used for agriculture even in good years, gave good harvests because of increased water retention. Planting in rows perpendicular to the slope of the field also gave startlingly good visual results. Unfortunately, the data on this latter on-farm-trial, was lost through a misunderstanding that led to harvesting before a project agent could come to weigh the grain. We have received many requests to be pilot farmers for the coming year, and we are planning a training program in animal traction in May to prepare pilot farmers for the 1982 rainy season. We are also regularly receiving more requests to have animals trained than we can handle.

The new cereal varieties Souna III and Sidi Nialiba have also proved successful in on-farm-trials, giving yields approximately equivalent to those obtained with similar techniques on our own research sites.

10° - Establishment of a range management test and demonstration area : The 500 hectares Katanmagua site has been fenced and capped. The three required catchment basins are completed, though one is in the process of being cemented to limit loss of water into the ground. Two small and one large storage buildings have been built and maintained. A vaccination corral has been constructed out of local termite resistant wood (the same wood used for the fencing with five strands of barbed wire) and cattle and small ruminant scales have been installed in chutes. Sheds and corrals have been constructed in each of the pasture blocs for the project herds there, including pens for claves and kids and lambs. The site has been divided by barbed wire (5 strand) fences into four blocs of approximately equal surface area, though one of the blocs contains a 25 hectare agricultural and pasture improvement site and a 25 hectare forest has been fenced in for protection in the south east corner of another bloc, without diminishing its surface area. The villagers of the ZID have lent us sufficient animals (cattle, sheep and goats) to conduct our experiments with. These have been on the site since November 1980.

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11° - Demonstrations of ruminant nutrition : During the rainy season of 1981 there were four herds on the Katamangue. In Bloc A a herd of cattle and sheep at 0.4 UBT/ha ; in Bloc B a herd of cattle, sheep and goats at 0.8 UBT/ha ; in Bloc C a herd of cattle sheep and goats at 1.2 UBT/ha ; and in Bloc D a herd of cattle at 1.5 UBT/ha. Blocs A and D receive only hay from natural pasture. Bloc B's animals receive residues from the harvest (millet and sorghum stalks, and peanut and bean leaves) in addition to natural pasture. All the herds have water trucked to them as the wells dug on the Katamangue have not produced water. The herds are mixed because we are interested in the impact of animals on vegetation, as well as that of vegetation on animals, and thus wanted to reproduce, as closely as possible, the situation of most pastures in the region, where mixed herds graze. In addition, most herders have all three sorts of animals and are interested in the best husbandry techniques for all three. Camels are infrequent and highly seasonal in the Guidimaka and thus were not included in the herds.

The purpose of the above nutritional experiment is to test whether or not industrial feeds and harvest residues are economically viable additives to animal feed in the Guidimaka. Mr. Greenwood, the Project range specialist feels that he has now sufficient data to make a preliminary analysis of the results of the first year of the animals' presence on the site. We have also carried out haying experiments on the Katamangue and the hay is given the animals of Bloc B along with their harvest residues. The results of these experiments have not yet been analyzed either.

Groups of herders from approximately 20 villages have come to visit the Project sites and have heard explanations of the animal husbandry, pasture improvement, sylvicultural and vegetable programs from the technicians of the concerned divisions of the Project.

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12° - Develop among herders a general understanding of range management principles and techniques. As opposed to the other domains in which the Project works, range management is a relatively new science in Mauritania. Very little is know about the range and how best to use it. Thus, most of the range division's time and effort to date has been devoted to finding out how best to use the range resources of the region. Nonetheless a certain amount of education has taken place through the demonstration effect of our herds and pastures and the village visits mentioned above. In addition, the Range team has undertaken missions of education and research in all the villages and even the uninhabited corners of the ZID. For example, last May and June, when there was literally no grass left within 15 kilometers of Selibaby, we let approximately 2000 cattle onto the Katamanguo site for about a month. There was no mortality among these cattle and we feel that many of them were saved by this pasture that we made available close to the water they drank in Selibaby and Danguerinou. I have heard constant favorable comment on this action in the villages of the ZID this year.

The purposes of the range research are : to determine the ideal carrying capacity of the range ; to determine the effects on vegetation of different numbers of animal units per hectare ; to determine the contribution of tree species to the sustenance of the animals throughout the year ; to determine the effect of supplementation on the development of the weight of the animals ; to determine the effects of the seasons on available vegetation and the condition of the animals ; through cutting experiments to determine the best usage pattern for available pasture ; to introduce appropriate grass and tree and leguminous species to improve the pasture (local and imported varieties).

We have received permission from the Regional government to establish small pasture reserves in a few villages in the ZID this year and two villages have ~~[illegible]~~ already expressed a real interest in doing so. We hope to have these reserves operative in time for the current rainy season. There will also be tree planting on these reserves, as well as introduced grasses and legumes. The main purpose of the reserves, in addition to reconstituting

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the natural vegetation of the land which has been hurt by the recent droughts, is to preserve pasture near sources of water, we hope to diminish, at least for some animals, the long walk from water to pasture which is necessary in May and June as the pasture near the village where there is water has been eaten. The value of such techniques as restricted grazing and feed/water balance has already penetrated the herders of the region. However, we have to find a way to apply these techniques and these limited reserves are the best possibility for the moment, given the lack of a national pasture use law in Mauritania.

13° - Demonstrate the value of animal health and sanitation : This aspect of our program has two sides. On the Katamangue site, our animals are thoroughly monitored and cared for. They undergo regular vaccination and deparasiting, both internal and external. The effects of these treatments on the animals are explained to the visitors who come regularly to see them and in educational missions to the villages of the ZID. These explanations are supported by the visible good health of our animals and their relatively high rate of reproduction. They have excited comment throughout the ZID and all the villages that have lent us animals regularly ask us if we do not want some more. Thus I conclude that the demonstration of animal health and sanitation is successful. This idea is reinforced by the second phase of our animal health and sanitation program.

The project has received the authorization of the Directorate of Animal Husbandry in the Ministry of Rural Development to sell veterinary drugs to the herders of the Guidimaka. The herders have been used to receiving these drugs for free from the veterinary service of the region, but in recent years, financial problems have prevented this service from providing the drugs and it has become government policy to encourage people to buy drugs. There was thus considerable doubt if the villagers would accept paying for drugs they had always received for free in the past and the Project's sales of these products is an important test case. Thus far we have been able to see no resistance to making this sort of investment in their herds among the animal owners of the Guidimaka. Certain products, such as anabot (an anti-botulism vaccine), we are having trouble keeping in stock. Certain others like Berenil or Novar, sell slowly and steadily. Some others

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like thibenzole seem to go in spurts. Nonetheless, we have sold nearly UM 400,000 worth of drugs in approximately a year of operation of this program. The herders are now getting used to having this service and some villages have even refused to accept the free vaccination against rinderpest if the anti-botulism drug was not available for sale at the same time.

14° - Assist the GRDH animal health service : The DRIG Project assists the animal health service in the Guidimaka in numerous ways, just as we assist the other RDR services in the Guidimaka. Each service receives from the project in kind the equivalent of UM 7000/month to help them meet the increased responsabilities that collaboration with the DRIG imposes on them. The DRIG garage does all repairs and maintenance on RDR cars, provided they furnish the necessary parts. The appropriate RDR sectors accompany DRIG missions in the ZID and DRIG agents accompany sector missions. If these missions are in the ZID, the DRIG furnishes the gas when the sector car is used.
For the Animal Health Service in particular, we provide Project trained vaccinators to help with immunization campaigns and to sell drugs to herders in conjunction with Animal Health Service (AHS) missions. When the AHS cars are broken down, all their campaigns operate with DRIG vehicles. We provide a good deal of material to help them provide services to the herders of the region. Approximately $ 15,000 worth of veterinary equipment (not drugs) was delivered to the AHS in Selibaby in 1980, in accord with the provisions of the first Pro-Ag. This material, which included a kerosene freezer, was ordered along with the veterinary material for the Project itself. As this material breaks or wears out, the DRIG provides what it can to help the animal health service from our own stocks. The AHS is forbidden by the Directorate of Animal Husbandry in Nouakchott to sell drugs for us. Thus they give prescriptions to herders who need drugs and the herders come to us. Without these prescriptions, we do not sell drugs. In cases where the AHS technicians cannot handle a disease or injury to an animal, the DRIG veterinarian will intervene at their request.

All animal service educational campaigns by the DRIG are planned in conjuction with the Animal Health Service and we make clear to the villages that the AHS participates in all DRIG activities. Thus, we assist the AHS with their tasks of educating the herders to practice good sanitation and to care properly for their animals.

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15° - Distribute veterinary drugs (see above)

16° - Establish village veterinary pharmacies : This aspect of the DRIB programme has fallen a bit behind schedule, due to the gap of nearly a year in which we did not have the technical personnel to supervise the activity. Now however, we have informed all the villages in the ZID of the program and have identified 7 volunteers. The training program has been established in conjunction with the AES, where the training program and to constitute the first village pharmaceutical case are being assembled and will be complete in time for the first traing program of 10 days which is now scheduled to begin on February 10,1982.

The idea of these village pharmacies has been accepted by the AES Directorate in Nouakchott and by the Regional Administration. The villages are enthusiastic about it, but as the idea is new, many of the more conservative villages are awaiting the results of the first batch of village pharmacies before sending us an agent. I cannot disapprove of this strategy, but it does mean that we need another year to extend this opportunity to the other villages of the ZID.

17° - Involving women farmers : This aspect of the DRIB Program has not gone quite as well as we had hoped. While a number of women participate in the vegetable gardening program - one cooperative of women in Selibaby and about 20 individual gardeners in different villages - and a number of women have purchased carts for transport of agricultural products, we have not had a satisfactory participation of women in our rainy season cereal campaigns. We feel that this is the result of faulty extension techniques on our part. Nonetheless some progress has been made. In the Guidimaka today, women and men work together on most fields. Thus if innovations are introduced in a village and are applied in village members' fields, the women benefit from these innovations and provide labor for their application. In this way they learn the techniques. However, as women did not traditionally produce the major inputs of cereals for family diets and are still only now coming to share this task with the men, they are quite conservative in

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practices and less ready to innovate and try new approaches than the men are. They generally insist on associating the men with any decisions of this sort and thus our program to work with women apart from the men, was doomed to failure. We did have one female pilot farmer last rainy season whose harvest was significantly improved by her cooperation with the DRIG Project. We hope to have more next year. We have worked to improve storage techniques, particularly for niebe and peanuts, but thus far have not found solutions to the invasions of insects that destroy seed stocks and diminish reserves of these crops.

We have trained two female extension agents who work well and provide supervision for the women gardeners and pilot farmers. The male extension workers also work with these women once their participation in our program is established. The women have the same program as the men, both for cereal production and vegetable gardening. They are introduced to the same improved techniques and tools as the men are. The female extension agents provide demonstrations of preparation techniques in the villages when requested. In most villages this is unnecessary, as men who have returned from France teach their wives what to do with the vegetables they do not know. Since local, traditional vegetable crops such as niebe leaves and onions resemble introduced crops and are prepared the same way, teaching the new skills is not complicated.

We have requested that the Ministry assign us a female social worker to revitalize this aspect of our program, though we have not yet heard from our Project Director whether or not this request will be granted. If it is, we will provide the woman with sufficient agricultural training to complement her skills as an agent of social change.

18° - Small infrastructure projects : This has been one of the most successful aspects of the DRIG Project. During the cold and hot dry seasons, there is relatively little agricultural work to do in most villages. There is thus labor available to improve the quality of life for those whose life is centered on village communities. Since one of the main goals of the Project is to keep people in the rural areas where they can contribute to increasing agricultural productivity through applying project introduced innovations, we feel that we should encourage the villages to improve their infra-

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structure, since one of the main reasons for leaving the villages is lack of the things we help them to provide for themselves : water wells, schools, dispensaries.

We planned to have one such infrastructure project per village in the ZID thus 32 projects. Each project has a maximum expense limit of UM 50,000 or 25 % of the cost of the Project, whichever is lower. In general, villages provide all the labor, both skilled and unskilled and all locally available materials : bricks, sand, gravel, stones, mats, wood, etc. The Project generally provides imported materials : cement, steel, nails, doors, windows, etc., as well as technical advice when necessary. We occasionally send Project skilled workers to stay a few days in a village to help with such tasks as installing foundations, putting in cement blackboards, reinforcing well sills, etc. Thus far the following projects have begun or have been finished :

- Mbakhere - one room school - finished
- Soufi - two room school - finished
- Tounniatt - water well - in progress
- Lamra - water well - in progress
- Nahasso - water well - in progress
- Dialla - well and trough - finished
- Diagui - one room school - in progress
- Kounka Ndao - two wells - finished
- Bourondji - water well - finished
- Sabousaire - two room school - finished
- Wompou - four room school - in progress
- Sanga Diari - two room school - finished
  dispensary - in progress
- Ould Dame - one room school - in progress
- Mbaedia Jakha - Two room school - in progress
- Diarabe - water well - in progress
- Kininkoumou - vaccination corral - finished
- Darguerimou - water well for garden - in progress
- Barbaradougou - water well - finished
- Selibaby - fance around cooperative garden - finished
- Selibaby - water well for new quarter - in progress
- Hundallaye - water well - awaiting hydraulics service
- Selibaby - well N° 2 for new quarter - awaiting hydraulics service.

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Thus ten projects remain unassigned for the moment. Most of these will begin soon as there are still a number of villages in the ZID who are organizing themselves for the effort to take advantage of this aspect of our program. We regularly receive requests to begin projects from all over the region, and for those outside the ZID we refer to the Regional administration for guidance in choosing worthy enterprises, since many of the ZID villages are too small or too transient to undertake such infrastructure projects.

19° - Forestry Components : A nursery has been established in Selibaby itself on approximately 3/4 of a hectare of land ceded to the Agricultural sector for our use by the Prefecture of Selibaby. A well has been completed, from which water is hauled by a pair of project-trained bulls. The nursery produces between 16,000 and 25,000 trees per year, with its staff of 10 full time workers. It is fenced and a shaded area exists for sensitive plants. A storage building has also been completed on the nursery site.

The Project estimates that it has planted approximately 30,000 trees so far for forage, shade, erosion control, live fencing, and ecological reconstitution. Most of these trees have been planted on our sites, especially on the Singha and Niarwalla, though a significant number have been planted in villages including Selibaby, principally for shade.

This year most of the tree-planting effort will be directed towards the several pasture reserves we intend to set up in the ZID, as well as replacing trees that die on the sites. We hope to plant approximately 20,000 trees this year by transplantation and direct seeding. The main varieties planted will include : leucaena, acacia senegal, bauhinia refescens, neem, albizzia lebbek, acacia radiana and acacia nilotica. In addition a large number of parkinsonia will be planted as live fencing, both in villages and on sites. Leucaena seeds have been ordered from the US and local tree seeds are being collected as the appropriate species mature. I do not think that we shall succeed in planting 100,000 trees before December 1982 and I do not know where that figure came from. Nonetheless, we shall plant a lot of trees.

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20° - Training : Three sorts of training are carried out by the DEIE Project. Mauritanian counterparts assigned full-time to the Project work in daily association with highly trained expatriate experts and learn from them, as the experts learn from their knowledge of local habits and conditions. This learning process is clearly a mutual one as experts, mauritanian and foreign, exchange those aspects of their experience that can best help the Project accomplish its tasks.

Second, the Project has a budget to send the Mauritanian counterparts on short term training courses in subjects related to Project tasks. Such training has already been carried for one counterpart, is currently underway for two more, and is planned for three others. We have requested information for training courses for two more of our counterparts. Thus :

- Wague Ousmane, animal husbandry : three month course in parasitology and laboratory techniques at the CNERV/Nouakchott, 1980.
- Ba Abdoulaye, forestry : ten day course in forestry nursery management at the Senegalese National Forestry Research Center, at Hann, Dakar, January, 1982.
- Kebe Souleymane, animal husbandry : one month course in parasitology and laboratory techniques at the CNERV/Nouakchott, January, 1982.
- Ba Sourakho, forestry : three month course in reforestation techniques and nursery management in Senegal at the Various sites of the Senegalese National Forestry Research Center, March-June, 1982.
- Ba Khalidou, agriculture : three month course in animal traction and agricultural extension, at the Senegalese National Agricultural Research Center in Bambey, April-July, 1982.
- Wone Abderrahmane, Mauritanian Chief of Party : accepted for a three month course in Project evaluation at the Pan African Development Institute in the Cameroons. We await ministry approval to process the paper-work for Mr. Wone's training.
- Kane Abdoul Karim : we have written to Bambey to request that Mr. Kane take a three month course in agricultural research techniques there before the 1982 rainy season. We await their answer.

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For other counterparts, Barry Hamadou Issa and Kone Mousca, we are exploring possibilities for training.

Finally, we have trained the 9 required animal trainers and are training a second group now. They are all at work in Selibaby and the ZID training animals for peasants and working project animals in demonstrations of the usefulness of trained animals. We have trained five extension workers in animal health and husbandry, four in range and forestry, and eight in agriculture, including two women. An additional man has been trained for vegetable production extension, though his literacy level is not high enough for him to count as a full-fledged extension agent. Thus we have satisfied the requirement that we prepare eighteen extension agents for work in the various fields of the Project in the ZID.

On the basis of the above summary of project accomplishments in relation to the goals stated in the contract between EI and USAID, I feel that the Project staff, mauritanian and foreign have on the whole done what we were supposed to do and have been successful in the execution of our assigned tasks to the extent that the ecological conditions of the Guidimaka have permitted us to be so. The villagers have been seeing our personnel regularly for the past 2 ½ years and have confidence in us, since what we have undertaken in their villages has worked. The Project staff of 180 employees has been trained to accomplish our research and maintenance tasks efficiently and enthusiastically. Most of these employees, who would have left the Guidimaka in search of employment elsewhere if the Project had not hired them have continued to cultivate their fields around Selibaby and in the ZID and have learned new skills that should permit them to earn a living while remaining in the rural areas in which these skills are applicable.

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PARTS 3 & 4 - CONSTRAINTS ON DEVELOPMENT IN THE GUIDIMAKA AND POSSIBLE SOLUTIONS TO ELIMINATE THEM

The Guidimaka is officially classified as a Sudano-sahelian zone and thus development there must cope with constraints implied by the climate and soil conditions associated with such zones. It is also the most isolated of the agricultural areas of Mauritania, far from the capital of the country and the national administrative and technical services based there. This too, imposes constraints on development of the region. Finally, the peoples of the Guidimaka - four ethnic groups, two major adaptive patterns, innumerable factions and clans, as well as many returned emigrants from Europe and Senegal- impose constraints on development, as well as being subject to them. In this section of the report, I shall present brief analyses of some of these constraints. Some of them the DRMG project can help overcome. Others can only be overcome by the Regional administration of the Guidimaka. Still others require action on the national level. Where the DRMG can hope to make a contribution, I shall explain in some detail. Where higher level organizations must act, I shall briefly outline my impression of a positive form that this action could take.

I - ECOLOGICAL CONSTRAINTS

A - Water is the primary factor limiting agricultural development in the Guidimaka. In this context, I take agriculture to include animal husbandry, range management, and forestry as well as cereal and vegetable crop cultivation. The Guidimaka needs water for domestic consumption and hygiene, for gardening and agriculture, for watering herds of animals, and for construction of basic infrastructure. However, all the studies done in the region indicate that there is no phreatic water table available for tapping and thus no large amounts of underground water that might be made available. In most inhabited parts of the region, including the [illegible], shallow, dug wells of between eight and thirty meters can provide limited amounts of water for the domestic consumption of the population that digs them and perhaps some surplus for watering domestic herds of animals. As the rainfall in the region decreases -we are supposed to be in the 500 mm zone but in the last three years have had 300 mm, 500 mm and 450 mm of rain- the level of

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water in these wells drops and they have to be deepened. Also, population increases in some areas means that more wells have to be dug. If these wells are not deepened or dug, the population simply leaves the zone in which they can no longer live and go to Selibaby-town or to the river or elsewhere, to try to earn a living as domestic or agricultural labor in between the rainy seasons when they can return to their homes to farm. Of course, each year that this process goes on, fewer and fewer of the young people who should be the backbone and future of these communities return to the hard life in the fields. They prefer to continue to work for others or to quit the region entirely and enter the modern sector permanently.

The lack of water for human consumption and hygiene in the villages is not the only reason for the rural exodus in the Guidimaka, but it is an important one. And it can be solved relatively cheaply and easily. The villages in the ZID that have cooperated with the Project in its well-digging (small projects) program include some of the poorest communities in the area. If the Project supplies the cement and steel for the well they manage to find everything else and to provide the skilled and unskilled labor necessary for the enterprise. The opportunity to participate in this aspect of the DRIG Project should be extended to all the villages in the Guidimaka. Since the villages themselves determine their highest priority needs for this program, there is no danger of digging unnecessary wells or of omitting villages that should have such wells.

The hydraulics service in the Guidimaka also digs wells for villages. However, the Guidimaka Brigade is underequipped and under-financed. It cannot hope to do more than a few wells a year if they to them from start to finish. Also wells they dig are far more expensive to everyone concerned than are hand-dug, artisanal wells. The latter are as sturdy as the professionally dug wells if the construction is supervised and enough steel is employed. However, the hand-dug wells often encounter rock that is too hard for picks or chisels and sledge-hammers to break. In these cases, the intervention of the hydraulics

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brigade with their jack-hammers and dynamite and skilled technicians is imperative. I feel that the hydraulics brigade in the Guidimaka should limit itself to deepening wells where the villagers have found rock and to supervising the villages own digging of hand-dug wells, employing local artisans. This would permit the Brigade to intervene far more effectively in far more places than they do now and would encourage employment of the local well diggers and their teams. This latter would not diminish agricultural production since wells are not dug during the rainy season when the well digging teams return to their farms.
The wells thus dug provide water to stabilize communities near their farms, but also permit gardening during the cold season, watering of domestic herds near villages where pasture reserves may be established, and tree planting in the villages themselves. Women often walk as many as 7 kilometers to water or take donkeys even farther. Digging wells close to villages would cut dramatically the amount of time and effort invested in so basic a process and free the women for other pursuits.

Water for agricultural uses is a problem much more difficult to resolve in the Guidimaka. Aside from villages along the Senegal River, where pumping stations have been installed to take water to levelled fields and in a few villages along the Karakoro River where flooding creates zones of Walo land which provide cold season crops, the farmers of the Guidimaka depend on rainfall to plant and harvest their fields. As rainfall has diminished in recent years, this has meant that a good bit of land has gone out of Cultivation in recent years (higher land particularly) and that the pressure on lowland fields has increased dramatically to the point where for the first time in the history of the region, there is not enough good land for everyone who wants some to farm. In addition, the lowland fields are very risky as they are subject to flooding in good years, or even after big rains in dry years. Irrigation from underground water is impossible, given the absence of reserves of this kind in the area.

The solution to the dilemma of irregular rainfall and flooding of lowland fields seems to lie in the construction of small dams and water diversion

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structures in the dry stream beds that carry run-off water to the Senegal River, where it does no good for any of the areas farmers. I feel that the DRIG Project should be authorized to create a dam-building capacity in its follow on activity. This would mean finding experts in this field and providing them with the resources to carry out the program they would plan. Studies executed in the Guidimaka, both by expatriate firms like Burgeap of France, and by the Regional Administration have analyzed the possibilities for creating water reserves in the Guidimaka and there are many favorable sites. The water they collect could be used to irrigate crops on nearby fields, to water animals near pasture zones, for gardening and tree-planting and, in emergencies, for human consumption and hygiene. In addition, crops could be planted in the pond-beds themselves as the waters recede.

Water for animals would come both from the wells and the dams proposed above, but neither would solve the dilemma in the Guidimaka posed by great stretches of grass-lands far from any possible source of water. In certain zones, like that near Tectac, where certain authorities pretend that there is a large underground reserve, drilled pastoral wells might be tried. I do not feel that the DRIG Project should undertake this operation, but rather that it should be entrusted to specialists. However, on our demonstration sites I feel we have proved the usefulness of catchment basins, at least for 5 months of the year in holding runoff water that animals can drink. If such basins are available to animals during the wet season in remote pasture areas without dry season water, then perhaps herds could be encouraged to congregate around them, leaving for the dry season, pasture nearer to traditional sources of water in oglats or dug wells. Unfortunately, the DRIG bulldozer is still in Nouakchott undergoing repairs that should have been done before shipping from the US and I am not sure that it will have time to try digging basins in the Guidimaka this year. However, this should definitely be part of the program of any follow-on activity after the end of the DRIG in 1982.

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No Project can do anything about diminished rainfall or falling water tables in the Guidimaka. But through a combined effort of animal traction plowing, planting perpendicular to the slope of fields, tree-planting, nature protection, well-digging, dam-building, and basin-digging, a future Integrated Rural Development Project could improve significantly the hydraulic situation of the region. The DRDI has made a good start on many of these activities and has established their worth. Now they must be extended to all the farmers and herders of the region.

B - Land : There is plenty of land in the Guidimaka, but there is not enough land that is agriculturally reliable in the context of diminished rainfall, lack of wells, and lowland field flooding explained above. Before the drought the farmers of the Guidimaka used sandy or clayey plateau land for most of their agriculture (Singha or Katamangue or Parawolle, in Soninke). They avoided lowland (rakhe) areas where too much water would destroy their crops as effectively as drought. Today, however, the rakhe lands are the most desired agricultural sites, in spite of the risks of flooding there. Unfortunately, there is relatively little rakhe land available and it is all controlled by the dominant families in any given village. Thus, in spite of the vast surface of the Guidimaka relative to its population, there is a land shortage.

This shortage is complicated by the deficiencies characteristic of most sahelian or sudano-sahelian soils. These are everywhere relatively poor in organic matter, and lack nitrogen completely. They are generally poor in other essential elements, too. The land could produce more if it were helped to do so by judicious supplementation.

Certain aspects of this problem, the DRDI Project can do nothing to solve. Questions of land tenure and local social organization must be met by the regional administration backed up by the central government. A Project can only apply government policy as embodied in the Pro-ag that governs it and work with those peasants and herders who choose to participate in its program. However, the current DRDI program is conceived to meet certain aspects of these problems and to contribute

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to their solution. These activities should be expanded in any follow-on project and extended to the entire region.

The main reason why whole categories of agricultural land in the Guidimaka have gone out of cultivation is lack of water. However, using a combination of animal traction plowing and weeding and planting perpendicular to the slope of the field, much water is retained. Fields thus treated remain moist and soft long after untreated fields next to them have become hard and dry. Crops planted on them yield more than crops on similar land not-so-treated. Crops such as Souna III in sandy zones and Sidi Kieliba and E-35 in clay soils are early maturing and well adapted to such upland soils. They can give a decent harvest even in droughts when other varieties fail utterly. The use of animal traction for field preparation and weeding liberates enough labor for farmers to plant higher yielding varieties in the lowland fields and still plant these quicker, drought resistant varieties as insurance crops and supplements. This will be particularly important if dams permanently flood the rakhe zones near subject villages. In addition, the project is currently testing other imported cereal varieties that may prove even better adapted and higher yielding than currently used ones. For this reason, I feel that a follow-on activity to the DRIG must include the continuation of the extension package of animal traction, improved varieties, and improved cultivation techniques, as well as the continuation of variety testing in conditions that reproduce as much as possible those that local peasants face each rainy season.

The soil fertility question can also be approached by Projects like the DRIG. Although we feel that chemical supplements like industrial fertilizers are too expensive for use in rain-fed agricultural zones like the Guidimaka, there are locally available methods for improving soil fertility which we have tested and should try to extend. These include green fertilizer, manuring, composting, crop rotation, associated culture and inter-cropping. All of these are currently being tested by the DRIG and some are already being extended in on-farm-trials.

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Results are promising, particularly on marginal soils like the Hizrawle. This experimentation must continue and extension of proven techniques must reach all interested farmers of the Guidimaka.
A final constraint on land use in the Guidimaka cannot be attached by any action on the part of the MEDD or any other Project. The Guidimaka's pasture is among the richest in Mauritania. Nonetheless, it is becoming less rich each year, as herds from all over the country take refuge there from drought stricken zones. A recent dry season survey showed herds from the Tagant, the Gorgol, the Western Hodh, and even from the Brakna on pasture in the Guidimaka. This has led to progressive denudation of pasture areas and to increased brush-fires, either set accidentally by herders or purposefully by those who would keep the herds off their lands. Even if this process of degradation through overuse were not in progress, the Guidimaka's pastures need improvement. Bromotological analyses of available vegetal matter on typical pastures show that while they provide sufficient energy they provide almost no protein or nitrogen for a good part of the year. The animals thus can eat as much as they want and still lose weight, sicken and die. They must supplement the straw they eat with leaves and shoots from the Guidimaka's dwindling supply of trees. These trees are regulary massacred by illegal lumberers as well as herders cutting branches for their sheep and goats to nibble on.

Pasture in the Guidimaka can be improved by planting trees. It can be improved planting native and imported leguminous species, which fix nitrogen in the soil and provide rich fodder long after the grasses have lost most of their food value. The DDRG Project has tried out these techniques and found out which species are best adapted to different terrains and conditions. The government has authorized us to try out these techniques in small pasture reserves which we have permission to fence in and protect from herds other than those of the peasants who created the reserve. We expect this program to be successful but it is not, for the moment, extendable.

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Mauritania does not have a national law limiting access to pasture, nor is there any precedent for fencing in large areas of pasture for the exclusive use of a given group of people and their herds. Without such a law, a major program of pasture improvement is difficult to conceive. Planting trees or new grasses, installing leguminous species or plowing denuded areas to catch seeds in runoff water and refurnish them require heavy labor inputs. The people of the Guidimaka are prepared to undertake such tasks, but only if they can be assured that the fruits of their labors will be for themselves. Without a law that guarantees them this result, they cannot be asked to undertake large scale pasture improvement.

The only alternative to this approach is the establishment of government reserves, fenced and replanted with hired labor, that could be opened to public use at specific intervals decided by the regional administration. These reserves could be supervised -both in their creation and their administration- by a Project like the DRIG or by the local antennas of the MDR. If the government makes the land available, this sort of enterprise might be included in a follow-on activity to the DRIG Project.

II - INFRASTRUCTURAL AND ADMINISTRATIVE CONSTRAINTS

A - Roads : The Guidimaka is Mauritania's most difficult province to reach by road. During the dry season (December-June) vehicles come from Nouakchott via Boutilimit, Aleg, Boghe, Kaedi and then either Maghama or Mbout. The total trip is of approximately 650 kms of which 400 are on unpaved roads. 300 kilometers of these roads are completely unimproved. The trip takes about 14 hours of driving in a land-rover and two or three days driving in a truck. It is nearly impossible to operate without four-wheel drive and breakdowns are frequent and severe. During the wet season, vehicles must come from Nouakchott via Kiffa, l'harraj, Ould Yenge and Soufi. The latter 200 kilometers of this 850 kilometers run are over what is generally said to be the worst important road in Mauritania. Most vehicles can get to Kiffa in a day, but from there to Selibaby takes a minimum of 8 hours and often two or three days. Trucks occasionally spend a week or more on this road.

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Given these conditions, it is difficult to bring anything into or out of the Guidimaka. This limits development in every sense of the word, but agricultural and pastoral development suffer markedly from the impossibility of marketing anything produced in the region outside of the region, except illegally in Mali or Senegal. The DRIG Projects only contribution to the solution of this problem would be a secondary one. If our bulldozer comes and we begin a limited fire-break program, these fire-breaks would serve as secondary roads (see below). However they would in no way solve the main issue of opening up the region to trade and contact with the rest of the country.

USAID and the PNUD/UNSO have promised to build good roads throghout the Guidimaka on all the major axes. We can only hope that these programs will be quickly realized.

B - Brush-fires : There are no fire-breaks in the Guidimaka, although fire-breaks coming from Maghama and from Tintan stop at the borders of the region. At the same time, the rich pastures of the region are prey to frequent fires. This year, for example, in addition to many small out-breaks, major fires have wiped out large areas of pasture along the Karakoro from Mbaediat to Khabou and in the environs of Mbalou. We expect serious difficulties from these losses later in the year when herds from other regions begin to arrive in the Guidimaka and when water farther from the Karakoro begins to dry up and herds head for traditional pasture reserves near the stream-bed. When fires wipe out large areas of pasture they constitute a serious constraint on the development of the animal industry in the Guidimaka.

When the DRIG Project was beginning its operation in 1979, there was a lot of discussion about the usefulness of fire-breaks as an efficient method for limiting the damage done by brush-fires. Many experts felt that they did no good whatsoever and they were dropped from the DRIG Project by USAID before the Project began operations. However, the experience of people who have worked in the region, including myself, is that fire-breaks do work. I cannot count the times I have seen one side of a road burnt out and theother side untouched by fire, even

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when the road was only three meters wide and far from perfectly clean. I am convinced that fire-breaks established according to the plan already worked out by the Nature Protection Service of the MDR would make a substantial contribution to the reduction of losses of pasture to brush fires in the Guidimaka. The inhabitants of the region are industrious and quick to attack fires they see and with a network of fire-breaks to work from they would be able to control all but the very worst fires. I thus think that the DRIG bulldozer, when it finally arrives, should spend some time making fire-breaks in the ZID. In addition, in a follow-on activity to the Project the full fire-break program included in the original study for the DRIG Project should be reanimated and executed.

Fire-breaks, I want to emphasize, have an important secondary function. They act as useful avenues of communication between villages that are otherwise isolated from centers of trade and administration. These 'roads' would facilitate transport by animal-drawn cart, as well as by vehicle and horse-back, and further encourage development work in the region by making extension work easier through more frequent visits to newly accessible villages and camps.

C - LACK OF WELLS AND CATCHMENT BASINS FOR STOCK WATERING

I have discussed the usefulness of these structures above. There are no basins in the Guidimaka now, except those dug on the Katamangue site. I know of only one pastoral well, near Ould Yengue, but I am not sure if its pump is working. The Project will continue its activities in this domain and any development activity in the region should include a provision for these structures.

D - LACK OF DAMS

As mentioned above, there are no dams in the Guidimaka now. Even the small dike at Artemou did not function properly this year, from of maintenance. The DRIG Project does not include dam construction in its current mandat, but any follow-on activity should attack this problem.

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E - Lack of banking and credit institutions : There is no bank in the Guidimaka today. The Project can and should do nothing about this, but the presence of a bank would facilitate all financial operations, permit credit and the control of exchange operations, and encourage industry, commerce and agricultural enterprise. The administration should encourage the opening of a bank in Selibaby as soon as possible.

Except for the credit operations run by the DRIG and the Agricultural Sector -the latter has not yet begun operations under the CCC-PAC grant- for the sale of animal traction equipment and trained animals, there are no organizations offering credit to the people of the Guidimaka at this time. The people of the region have quickly taken advantage of the possibility of credit to purchase the carts and plows we offered them. They have also begun to purchase our trained animals which have only recently been offered for sale. They seem to understand and accept the credit system, which was given us by the Directorate of Agriculture and is identical to that used by the CCC/PAC Program.

There are many things that could be purchased and well used by the people of the Guidimaka if credit were available to them : tools, welding equipment, pumps, fencing, breeding stock for herds, etc. I feel that a follow-on activity after the DRIG Project should include a generalized credit fund, if no other institution is available to offer this opportunity to the peasants. This fund would purchase and resell at cost and on credit whatever inputs seem appropriate to individual or collective agro-sylvo pastoral or associated enterprise, in the Guidimaka. I would suggest that all such transaction take place with the approval of the Governor, at least for collective purchases over a certain, pre-established sum.

F - Lack of seed for agriculture. Lack of tools and equipment

Year after year, we hear of farmers who stop planting peanuts, or niebe or one variety of sorghum or millet for lack of sufficient seed supplies. We have never been able to carry out a potato campaign in the region, in spite of promising results from experimental quantities of seed potatoes in our own garden, because we have not found a source which can supply

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and transport sufficient seed for on-farm-trials or extension work. The same is true of small agricultural tools and equipment. Transport and expense prevent their effective use and distribution in the region.

To a certain extent the DRRG's seed production aspects can palliate the difficulty for certain species, and should definitely be continued in any follow-on activity. But the national administration should set up a reliable system for providing large quantities of seed and equipment fo farmers and herders each year. These could be sold at cost plus transportation to finance the yearly renewal of the operation. I do not think the DRRG or a follow-on activity should get involved in furnishing this material, since national scale orders could be purchased and shipped far more economically.

G - Isolation from Senegal : Much of the agricultural material needed by the villagers and herders of the Guidimaka is manufactured in Senegal. International accords make this material easily and cheaply available. The material includes : peanut cakes and compaite feed for animals, mineral and salt blocks, cereal seed stocks, animal traction equipment, veterinary products and many other items. Now, the problem of transporting this material from Baker to Gouraye in Mauritania is difficult and expensive to solve. A ferry has been built by the GRM and is in Gouraye. Every effort should be made to render it operational to facilitate contact with Bakel. I do not see a role for the Project in solving this problem.

H - Limited resources at the disposal of the Guidimaka Regional administration If the amount of money, personnel, and equipment at the disposal of the regional administration were increased and more autonomy were permitted regional officials in making decisions about development policy in their zone of responsability, I feel that development efforts in the regions would be better coordinated and effective. To this end, the Government's current policy of maintaining their administrators in a given region for a relatively long period of time is to be applauded.

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III. Social and human constraints.

A. Rural exodus and labor availability.

For over one hundred years, young men have been leaving the Guidimaka to seek work elsewhere. At first they went to Senegal to work on peanut farms or on the docks of Dakar. Many got work on ships, usually as stokers, and travelled all over the world. The army attracted a large contingent from the Guidimaka and carried them to fight France's wars in Europe, Indochina and other parts of Africa. Finally, since the early 1950's many Guidimakiens, particularly Soninké, have gone to France to seek employment. In the past, most of these workers would return to work on family fields during the rainy season, but as they went farther away and established themselves in their country of residence, they returned less regularly and many never come back at all. Since those who leave are often the youngest, strongest members of the community, their absence has created a serious labor shortage in the Guidimaka.

The consequences of this labor shortage have been exacerbated by the drought, which has led even more people tolleave the rural zones for Sélibaby, Kaédi, Nouakchott and Nouadhibou. In addition, the social reforms introduced by the colonial administration effectively ended the exploitation of 'slave' labor by the noble families of the region and complicated the land-tenure and use situations.

Today, in France, nearly 80% of the Africans working in the country are Soninké. While most of them are from Mali, there are many Guidimakiens there, too. People of the Guidimaka are also well established in Nouakchott and Dakar and receive a regular stream of visitors looking for work or for opportunities to study. Few of these people ever return to live in the Guidimaka, and those who do generally have a hard time readapting to agricultural life there. The people of the Guidimaka are generally thought the hardest working group in Mauritania and in my opinion merit the label. However, if up to 70% of the young men in some villages are absent during a rainy season, it is hard for those who remain to carry out their tasks.

This has led to several consequences, both good and bad :

1. The emigrants send a lot of money back to the Guidimaka, which has permitted residents to invest in construction of houses and mosques, wells, schools, occasional vehicles and pumps, and, especially animals. The formerly non-pastoral Soninké may now be the most important group of animals owners in the region, though it is very hard to get reliable figures on this sort of trend.

2. The absence of the emigrants relieves a certain amount ofthe pressure on land, especially bottom-land in the Region.

3. The absence of men has led women to do more and more cereal cultivation for family nutrition. This has led to the abandonment of certain traditional female crops like cotton and rice, which are only cultivated rarely now. Others

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like peanuts are of much diminished importance, since the women must grow sorghum and millet for their families.

4. The absence of the men has led to ever greater investment in hired labor to do agricultural work. This generally takes men away from their villages to zones where they have no land and thus diminishes the general agricultural productivity of the region. These laborers are generally out of work the rest of the year and are forced into debt while awaiting employment afterwards. Many of them finally leave the region entirely.

5. The absence of the men prevents putting large tracts of potentially arable land to agricultural use, since all available labor is used for the preferred rakhe (lowland) fields.;

6. The absence of young men has a negative social impact on the villages as the young women have no suitors, the older men no heirs, and the village in general lacks the social stratum that in the past provided much of the animation that rendered village life agreeable and attractive. The older, more conservative men control decisions and often stifle initiatives taken by the few young men around. The role model of the traveller has become an ideal-type for the children of the village who look forward to the day that they too can obtain high status by quitting their place of origin and wandering across the globe in search of money and adventure. Thus the cycle continues.

7. With the lack of labor at the rainy season, agricultural work at which the Guidimakiens used to excel is now often done sloppily e- weeding is less thorough than it ought to be, too many seeds are planted per hole by inept or uncaring laborers or children, fields are inadequately protected from birds and monkeys because there are not enough people around to throw stones at the pests.

The above are only some of the most striking and easily described consequences of the rural exodus from the Guidimaka. It imposes serious constraints on development efforts since there is little labor available for any but the most essential tasks and this creates resistance to innovations that demand work. I want to underline that this is not an implication of laziness. The people we collaborate with in the Guidimaka are hard workers. But they hesitate to commit themselves to tasks they fear they will not be able to see through to the end.

There are thus many tasks to undertake to combat the rural exodus from the Guidimaka. There is no task more urgent than this one. Mauritanian government policy is oriented toward solving this problem and the projects efforts should also bend in this direction. They all revolve around the effort to make life in the rural areas of the country — and I feel that all of the Guidimaka, including Sélibaby is a rural area — more attractive. This implies improving economic prospects for those who live there, providing essential human services for them, and revalorizing rural life in the eyes of the nation as a whole. Much of this work can only be done by the national government, who might offer tax incentives to rural industries, broaden customs exemptions for goods destined to increase rural production, conduct educational campaigns to make people aware of the importance of rural occupations and roles, or send more dedicated officials to work in the rural zones next to the peasants and herders.

In the context of the government effort which is already underway to stop the rural exodus, a Project like the DRIG can make an important contribution. The following, very briefly explained are the sorts of activities that the Project has undertaken and will continue to undertake to help diminish the rural exodus from the Guidimaka.

1. Creation of jobs and training for rural careers. The DRIG project now has approximately 150 employees and has up to 250 at peak periods. Most of these employees will spend at least two and possibly more years in the employ of the Project. Studies have revealed that at least 50% of these people would have left the Guidimaka long ago if the DRIG Project, and previously, the construction of the Chinese hospital had not held them here. Approximately 80% of these people own land and 90% of former land owners cultivate fields during the rainy season. The official working day of 7h00 to 14h00 permits them to do so in a community like Sélibaby where fields are in general close to town. In addition about 50% of those who had not farmed before working for the Project (herders, merchants, laborers, etc) have met land-owners in the Project, borrowed land from them and now do farm. If the Project continues, many ofthese workers should remain with us and thus will not leave the region, as it is their stated intention to do. In confirmation of the above indications, of those workers who have quit the project ofbeen fired at least half have left the Guidimaka for Nouakchott or elsewhere to seek work.

Projects like the DRIG, since they are based on improving rural skills for rural careers train workers in fields which they can apply in rural areas, instead of being obliged to go to towns for employment. Thus we have trained : 15 men for animal trainers ; 10 for forestry nursery and tree-planting work, 20 for market gardening, 18 for rural animation, 20 for fencing skills, 10 in masonry and other housing maintenance and construction skills, 15 in automotive mechanics and electricity, etc. Many of these people already supplement their incomes with money from jobs done in after project hours for citizens who know their talents.

The creation of rural jobs combats directly the rural exodus and encourages general economic development as well as maintaining levels of agricultural production.

2. Creation of rural income. Very little of the money earned in the Guidimaka goes elsewhere for investment. People build houses, buy animals, encourage commerce and local services such as carpenters, weavers, etc. Thus Projects like the DRIG, with its local orientation and abeidance of major imported inputs for economic growth can promote rural stability by spending a good proportion of their budget in local markets. Up to now, for example, we estimate that the DRIG has spent approximately 1/3 of the budget so far expended in the Guidimaka itself and at least another 1/3 in Nouakchott. This is in stark contrast to Projects which depend onimported materials and often spend as little a 1/4 of their total budget inside the country where the Project takes place. Future Projects in the Guidimaka should continue the DRIG's effort to create incomes locally in order to promote local level economic development.

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3. Introduction of labor-saving technologies. Many of the young people who leave the Guidimaka now or who plan to leave soon are discouraged by the amount of agricultural work there is to be done in most families, relative to the labor available. The number of children and old people supported by each active adult is striking in its disproportion. Young men do not see a way out and thus go off to look for work hoping to be able to send back money to support their families. By introducing innovations like animal traction for plowing, weeding, or hauling water out of wells, Projects like the DRIG can show people how to produce more than ever with fewer people. The introduction of higher yielding varieties also helps, as do other agro-sylvo-pastoral innovations described above.

4. Elimination of ecological and administrative/technical constraints on development. These were described briefly in the previous sections of this report. I feel that Projects like the DRIG can make their most significant contribution in this domain.

5. Creation of infrastructure necessary for decent life and appropriate to the aspirations of the people. The people of the Guidimaka know the importance of schools, hospitals, and wells. They are prepared to contribute significant sums of money and unlimited labor and time to help create them. I feel that programs like the DRIG encourage self-reliance in local communities while providing essential material and technical support ought to be continuously available to the people of the region. Children raised in the villages and educated there are more likely to remain there than those raised elsewhere. Social networks will be firmer there and rural orientations maintained. Mothers who can see their children well-cared for by rural dispensaries will be less eager to move to town to be near medical facilities. Towns with wells are not abandoned. Those without them are always seasonal villages without stability or hope for the future. People have no reason to invest in such villages. With essential services they can plan their lives there and look to the future.

Roads, fire-breaks, dams, ferries and other essential services must also be established by the regional administration in collaboration with local Projects, where necessary. People want these public services as well as private ones like cinemas, shops, markets, and other distractions. The more the government and its projects can supply them, the more likely people will be to stay in the rural zones.

6. Public revalorization or rural life. The rural peasants and herders of the Guidimaka feel abandoned. They are rarely visited by government officers, and when they receive such visits, they rarely have the chance to express themselves. They feel removed from the regional authorities and even more so from the national government. They are convinced of these organisms indifference to their fate. While a general increase in the status of rural villagers is not within the reach of a regional administration or of the projects it coordinates, given adequate resources — vehicles or other transport, fuel, and personnel — much can be done to alleviate these feelings in the rural zones. Representatives of the administration, be they Ministry officials, Project technicians, or local administrators should visit the villages regularly. As the DRIG Project has slowly switched its main effort from research to extension, we have been more and more frequently to the camps and villages in our ZED. As we visit more frequently we have observed the people's confidence in our agents rising and

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their willingness to take advantage of our programs increasing. More and more of the young people in the villages have begun speaking up in meetings and taking part in our pilot activities. I feel very strongly that such programs as the DRIG, which involve several domains, all of which touch the lives of the rural people of a region, and which therefore must constantly have agents in the villages talking to the people, working alongside them, encouraging them, helping them accomplish tasks that they themselves have set as desirable collective goals, making resources available when requested and listening to the people's concerns make in this as in many other ways a very positive contribution to removing reasons for people to leave the bush for the cities.

B. Political Divisions among the elite of the Region.

This is not the place for an explanation of the dimensions and consequences of these divisions, but it must be said that they have placed constraints on economic and social development of the Guidimaka as one faction or another defeats plans made by their rivals. Happily, many of these divisions are healing now, after years of strife and we can only hope that the elite will now unite to encourage honest efforts to promote the welfare of the region, while maintaining a careful watch against corruption and favoritism. A Project such as the DRIG has no role to play whatsoever in eliminating this constraint.

C. Feudal social structures and land tenure traditions.

Here again, the DRIG or similar Projects have no role to play in eliminating the constraints on development that stem from these structures and traditions, but they must be mentioned. They do exist and they often complicate development efforts aimed at less advantaged strata of the population.

Conclusion :

The Guidimaka will not soon become an industrial center for Mauritania, nor a source of revenue from large quantities of export-oriented crops. However, in spite of the many constraints on development discussed above, the region may become entirely self-sufficient infood, even in bad years, and contribute significantly to ending the annual cereal deficit that plagues the nation and makes her dependant on gifts from abroad. An integrated program like that of the DRIG, in combination with well-planned infrastructural improvement can go far toward realizing the GRDM goals of increased food production leading to auto-sufficiency and slowing if not eliminating the rural exodus from the region. The constraints are formidable, but we of the DRIG Project feel that after three years of work, we shall have the technical knowledge and experience to combat most of them. Hand in hand with a dynamic regional administration, a follow-on activity based on the lessons learned by the DRIG, can do an enormous lot of good for those who need help the most : the peasants and herders of the Guidimaka.

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Part 5 : Questions to be resolved by the Evaluation

Two basic questions should dominate the discussions during the upcoming evaluation of the DRIG Project : has the Project Team carried out the requirements of the PP and the PP amendment of 1977 and 1981 ? And should some or all of the activities of the DRIG Project continue in Guidimaka after the end of the AID's financial support for Project C201, the DRIG, in December of 1982 ? The first set of questions should be addressed before the second and this report is meant to help provide answers to both.

I. Project performance to date.

Four basic questions need answers :

a. Are the innovations that the DRIG is trying to introduce in the Guidimaka technically feasible ?

b. Are these innovations economically viable ?

c. Are these innovations socially acceptable in the Guidimaka ?

d. Have the administrative and support systems built into the Project adequate to satisfy its needs ?

In addition the performance of the four administrations with responsibilities for the project must be judged :

a. Has the MDR fulfilled its obligations to the Project ?

b. Has AID/RDM performed the tasks it ought to perform to make the Project work ?

c. Has Experience, Inc. recruited the personnel and provided the support necessary to execute its contract to administer the Project ?

d. Has the Guidimaka Regional Administration helped the Project perform its tasks and has the Project helped this administration improve conditions in the Region ?

II. Future development efforts in the Guidimaka.

If the answers to the above questions are generally positive, the evaluation team should then turn its attention to how development efforts in the Guidimaka should follow the work of the DRIG Project :

a. Which aspects of the Project should be continued in their present form ?

b. Which aspects of the Project merit continuation, but should be modified by our experiences so far and by the new ideas of the evaluation team ?

c. Which aspects of the project should be eliminated from further development efforts in the Guidimaka ?

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Once these questions have been answered in a preliminary way, there are a number of details which I feel should receive attention from the evaluation team :

a. Should extension efforts currently limited to the ZID of 20 kms around Sélibaby be extended to the whole region ?

b. Should those aspects of the DRIG research program which merit continuation continue to take place in conditions which approximate local growing or animal husbandry conditions or should we introduce more ideal conditions to facilitate certain aspects of the research ?

c. Should the work continue to depend on local materials and inputs which most peasants and herders or groups thereof can afford or should we switch to expensive imported inputs like chemical fertilizers ?

d. Are there any new approaches which should be added to what is retained from the DRIG Project in any future activity ?

The Project Team feels strongly that at least three new aspects should be included : 1. an extended and more flexible credit program for peasants and herders ; 2. a dam-building program for small scale barrages that can be maintained easily by the interested population ; and 3. a human program based on that already begun by the Sélibaby hospital under Dr. Kane Youssef.

e. What new material, vehicles, personnel and buildings will be necessary for the the follow-on activity and how much will that activity cost ?

f. Fornhow many years should the follow-on activity last ? To what extent will foreign donor financing be needed and for how long ?

g. Where should sub-stations of the Project be located, if extension is to cover the whole region, and what sort of personnel and equipment will be needed ?

h. Should the Project request Peace Corps Volunteers to help with the added extension tasks, if they are approved ?

i. To what extent can the lessons learned by DRIG G2C1 be applied to Integrated or other development projects in other regions of Mauritania or the Sahel ?

j. How can cooperation among the four interested organisms be better fostered and encouraged ? Modes of interaction among USAID, the MDR, the Regional administration and the Project team and consulting Company (ET) need better definition.

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k. Should relations between the representatives of the MDR and those of EI/USAID on the Project team be defined otherwise than at present ? If so, how should this be done ?

l. Should the relationship that now pertains between the Project and the MDR representatives in the region be modified and how so ?

m. What steps, if any, should be taken to ensure the permanent institutionalization of the aspects of DRIG activities that merit such permanence ?

As incomplete as it may be, answers to the above questions will, I feel, help greatly in planning a follow-on activity to the DRIG Project;

Part 6. The Sociology 'Problem'.

As implied in the contract between EI and USAID for the execution of the DRIG Project, the Project sociologist (myself) will not have time before the end of the current financed period to analyze and write up the information gathered during the first 4 years of Project operation (April, 1979 - December, 1982). Thus some means should be found to permit this analysis and writing, so that this valuable information not be lost to future developpers in the Region.

Rather than bring on an expensive consultant for the analysis of this information based on discussions with the Project Sociologist, I propose rather that USAID obtain funding for an additional three months work by him two assistants and a secretary in Sélibaby and Nouakchott after January, 1983, and for one month in Washington at the end of this period. I believe that this solution wwould be the most efficient and least expensive, though USAID will have to contact Experience in Washington for approval of this use of one of their contract employees.

Part 7. Conclusion.

In spite of its uncomfortable length, this report is only a brief expose of the accomplishments and perspectives of the DRIG Project. I have summarized the technical accomplishments of the Project in the interest of vbrevity and thus beg the interested reader to refer for more precise information to the detailed reports which each Division of the Project furnishes at the end of each month and each campaign. These reports are available from the Directorate of Agriculture, USAID/NOUAKCHOTT, and from the DRIG offices in Nouakchott and inSélibaby. The Governor's Office in Sélibaby also has copies of all our reports.

I also would like to apologize to the technicians of the project for any inaccuracies or misrepresentations in my presentation of their work.

Finally, I would like to praise the entire DRIG team, whose dedication, energy and talent have created whatever success the Project has enjoyed in the first 34 Months of its life. The spirit of communication and cooperation that has dominated our work from the beginning is an irreplaceable trump card in the game of development work. One of the major advantages that any development team

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has in its work in communities of peasants and herders is its continuity and longevity. The power of the DRIE team's long association with the people of the Guidimaka, an association that has thus far been entirely positive, is not to be taken lightly. I feel that it is one of the major arguments for continuity in the financing and activity of the Project itself or whatever comes after it.

I feel that the Project, whatever its drawbacks or failures may be, has succeeded in helping the people of the Guidimaka and is now ready to amplify that help many times over. For this reason, I feel that the continuation of its activities should be a major priority for the MDR, USAID, and the regional administration of the Guidimaka.

ANNEX H

HISTORY OF PROJECT DEVELOPMENT AND EXECUTION

A brief summary is provided below, in capsule form, of key events in the Guidimaka Project's development and execution. Further details are availeble in the original Project Paper, the Project Paper Amendment of June, 1981, the Project Agreement and its amendments, as well as other project records.

PRE-PROJECT

. May 28, 1974 - Non-capital Project Paper submitted to AID/Washington involving assistance in livestock and environmental protection for Mauritania.

. May 1o, 1975 - Project Agreement signed for financing veterinary medicines, vehicles for veterinary service, firebreak construction, livestock food supplements, two cement lined wells and two vaccination corrals. Total cost: U.S. $340,000.

. June 5, 1975 - Project Agreement noted above amended to add U.S. $110,000 to finance:

1) research on range and livestock conditions and the sociology of the Selibaby area.
2) animal health surveys and investigation of incidance of major cattle diseases.

. Feb. 18, 1976 - Review, in AID/Washington of results of all research conducted to date. Decision made to develop an integrated project involving both agriculture and livestock.

PROJECT DESIGN

. May, 1976 - Design team fielded to develop project around themes of: (1) land use management. (2) testing of agricultural improvements, (3) improving agricultural extension and veterinary services, and (4) development of limited-supply water catchments in Northern Guidimaka.

. June, 1976 - Project Paper submitted to AID/Washington.

. August, 1976 - Reviews in AID/Washington raise major issues regarding content of the Project Paper and require its redrafting.

. June, 1977 - Project Paper approved.

PROJECT EXECUTION

. September, 1977 - Project Agreement signed between AID and the Government of Mauritania (GIRM). Total AID commitment: U.S. $3,346,000

Total GIRM commitment: U.S. $1,127,000

Project completion Date (PACD): June 30, 1980.

. January, 1978 - Original order defining, requirements for technical services (PIO-T) issued.

. March, 1978 - Request for Proposal (RFP) for technical services issued in the U.S.

. September 30, 1978 - Contract for technical services signed between AID and Pacific Consultants, Inc. (PCI).

Dollar value: $1,336,005

Completion date: August 30, 1981

. April, 1979 - First advisors from PCI arrive in the field.

. October, 1979 - First interim projected evaluation conducted.

. April-May, 1980 - Second interim project evaluation conducted.

. November, 1980 - Contract with PCI terminated; work continued under new arrangement with Experience, Inc.

. May, 1981 - Major Project Paper Amendment approved, modifying objectives and activities of project and adding additional time and resources for project execution.

Total AID commitment: $6,151,000

Total GIRM commitment: $1,670,000

Project Completion Date (PACD): December, 1982.

. June 4, 1981 - Project Agreement Amendment No. 5 executed, containing details related to project paper amendment.

COMMENTARY

The striking element of the foregoing overview of the history of project design and execution is the great amount of time required to get the project underway. Three years passed from the fielding of a design team to the appearance of the first technical assistance team members in Mauritania. One year was consumed in analyzing the design materials and reformulating the content of the project to the satisfaction of all parties.

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Three months were required to execute a project agreement with the GIRM, while the following six months were utilized in preparing documentation for obtaining bids for the technical services contract. Six additional months were needed to obtain and evaluate proposals and sign a technical services contract. Despite the fact that a year had passed since the signing of the Project agreement, seven more months were to pass before the first contractors appeared in the field.

A part of the delay can be attributed to the fact that the Guidimaka Project was the first bilateral project executed in Mauritania under the aegis of the AID Country Development Office in Nouakchott. Another aspect of the problem is the relative remoteness of Selibaby and the Guidimaka Region in general, making communication and transportation difficult.

Nevertheless, it is evident that basic implementation planning was deficient. In an audit report on Pacific Consultants, the Inspector General's Office notes that, "Overall performance under this contract (PCI contract for the Guidimaka Project) has been inefficient largely due to inadequacies in USAID/Nouakchott housing renovations and commodities support effort... We found that housing, commodity, banking and finance problems have plagued the project since the outset... Housing renovation difficulties caused the project to fall one year behind schedule... The houses were not available until April, 1979." (1)

After much effort, expense and delay, the housing was finally brought up to acceptable standards. Procurement has continued to cause difficulties, as will be noted in the following section on project administration. In any case, one of the root causes of the implementation delay was a lack of adequate planning regarding

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(1) Audit Report on Pacific Consultants INC., The Inspector General, AID, Report No. 0-000-81-58, March 20, 1981.

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basic implementation questions. This lack is in turn linked to a project design methodology which emphasizes feasibility analysis (economic, social, administrative, financial). Most AID project papers provide very little detail on the mechanics of actual implementation. It is not possible to foresee every practical detail of project execution, nor possible to project the timing of each project action. Navertheless a much greater emphasis on the commodity needs and the modalities of procurement, transportation logistics, housing needs and availability would mitigate the loss of time and financial resources in beginning and sustaining new projects.

Mention in the audit report of banking and financial problems relates substantially to the weak financial and administrative management supplied by the first contracting firm, Pacific Consultants, which was eventually replaced by Experience, Inc. Much USAID management time and the time of the contract technicians was dissipated in dealing with financial and managerial problems created by the PCI contract. A detailed review of this situation is contained in the above-referenced audit report.

The factors mentioned above, as well as the replacement of several team members over the life of the project, have contributed principally to the slippage in the completion date from June 30, 1980 to December 31, 1982. The relationship of this slippage to the status of the technical work is noted in Section 2 of the evaluation report. A summary of current administrative arrangements is provided in Section 6.

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ANNEX I

Source Material on the Project and the Guidimaka

Project Paper, Mauritania Rural Development Project, (682-0201) Country Development Office/Mauritania. Dated Dec. 16, 1976. Approved by AID/Washington, June 17, 1977.

Project Paper Amendment, Mauritania - Guidimaka Integrated Rural Development Project (682-0201), USAID/ Mauritania. Dated May 28, 1981.
Approved by AID/Washington, June 1, 1981.

Project agreement between the Islamic Republic of Mauritania and the United States of America for the Intagrated Rural Development of the Tenth (Guidimaka) Region. Original dated September, 1977. Amendments dated March 31, 1978; May 31, 1978; February 3, 1979; June 11, 1980; June 4, 1981 and August 24, 81.

Eléments d'une Monographie de la Région du Guidimaka, Direction des Etudes et de la Programmation, Ministère de l'Economie et des Finances, April, 1981. (produced in association with the RAMS project).

Audit Report No. 0-000-81-58 on Pacific Consultants, Inc., Regional Inspector General for Audit, AID/Washington, March 20, 1981.

Evaluation Report of the Livestock on Range Management, Portion of the Guidimaka I.R.D. Project, James R. Dickey, SDPT Livestock Advisor, May 12, 1980.

Agro-Economic Evaluation of the Guidimaka IRD Project, Contract No. AID/afr-C-1451, Ernest L. Murphy, Development Assistance Corp., May 21, 1980.