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FINAL REPORT

**GUINEA-BISSAU RICE PRODUCTION PROJECT**

**Project No. 657 - 0009**

**USAID**

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- I. Technical Report on Bolanha Development
- II. Technical Report on Extension and Agronomy
- III. Technical Report on Credit Program

## GLOSSARY OF ACRONYMS AND TERMS

<i>bas-fond</i>	-	French for low land
<i>bolanha</i>	-	Portuguese for a crop production area
<i>daba</i>	-	Portuguese for short-handled hoe
DEPA	-	Department of Agricultural Research and Experimentation
FAO	-	Food and Agriculture Organization (United Nations)
GOGB	-	Government of Guinea-Bissau
IRRI	-	International Rice Research Institute
PG (Pesos)	-	Guinean currency
PIO	-	Project Implementation Order
PP	-	Project Paper
<i>tabanca</i>	-	Portuguese for village
tons	-	metric tons

## **I. Background and History of Project**

The Guinea-Bissau Rice Production Project (657-0009) was initiated on August 28, 1980, at a funding level of \$4.5 million. The purpose was to increase the food production and farm income of at least 1200 farm families (7,600 people) in the Geba River Basin Area of Guinea-Bissau. This was to be accomplished mainly through an increase in rice production and by training the extension staff. The details about the outputs as stated in the original project paper can be obtained from the existing documents. However, it is important to point out the nature of changes to the original project paper recommended by an evaluation conducted in November 1984. In this report only those changes that are relevant to the changes in scope of work will be mentioned.

The original project paper emphasized the successful pump irrigation development of 300 Ha of river valley lands and upgrading of 100 Ha of basfonds, which are rain-fed lateral stream valley lands. Because of the rise in fuel prices and unreliability of fuel supply, an informal evaluation in 1983 recommended emphasis on basfonds development alone. Serious implementation problems encountered for four years led to the formal evaluation of the project in November of 1984 and its re-orientation. As a result of this evaluation, the project outputs were modified as follows:

- A. Successful introduction of improved water management techniques and improved agronomic practices in rain-fed basfonds.
- B. Improved management capacity of the Department of Agricultural Research and Experimentation (DEPA) in providing services to farmers.
- C. Trained extension agents serving farmers and an extension system in place. The guideline for this was to train forty extension agents through technical assistance and project-provided supplies.
- D. Experimental farmer associations supervised by DEPA technical personnel.
- E. Provisional Geba River Valley Development plan drafted.
- F. Trained topographer's aides and rural engineering staff.

The Project Paper Supplement discouraged the use of mechanized interventions and guided the project toward labor-intensive contour dikes for the control of water in the bolanhas. Low-tech inputs, such as animal traction plows, were to be encouraged. In addition, the project was to investigate the possibilities of assisting the farmers in developing associations and improving their total cropping systems. It was understood

that DEPA required assistance in improving its own management capabilities in order to provide better services to the farmers. The project was thus to assist DEPA in improving its extension service, continue training its topography team begun in phase one, improving general management at the station, and providing agricultural inputs to farmers.

With the redirection of the project, a different technical composition was required. A new team was recruited consisting of a Project Coordinator and an Extension Specialist/Agronomist. The Rice Production Specialist from the first team remained with the project. Given the short implementation interval, technical assistance was extended seven additional months, or until August, 1987. This report thus summarizes project activities in the phase January, 1985 through July, 1987.

There was little time after the redirection of the project to begin a new program. The project was able to initiate several activities, however, both in the bolanhas and at the DEPA station. As of July, 1987, 3 survey crews had been trained and water control structures had been introduced in 20 villages; the extension service had been reformed--agents recruited and trained; a credit department had been created for sale of agricultural inputs to the villages and personnel trained.

Serious constraints continued to plague the project, however. Many of these were due to difficulties inherent in living and working in Guinea-Bissau. Others, however, stemmed from serious administrative problems in AID/Bissau and management problems within DEPA/Contuboel. The time constraint became problematic, as skill levels at the station proved exceptionally low and training programs were accordingly scaled down.

Certain assumptions in project design proved questionable. Among these were economic incentive for, and farmer interest in, rice production, the willingness of farmers to contribute to a labor-intensive approach and the ability of the GOGB to sustain their extension program. In the end, many questions were left unanswered as to the success of the project in the Contuboel area. Many gains were made, however, and given improved economic policies, these can be built upon.

## **II. Status of Project at Termination of Technical Assistance as per Modified Project Outputs (PP Supplement)**

A. **Output:** Successful introduction of improved water management techniques and improved agronomic practices.

1. **Objectively Verifiable Indicator:** Introduction of technical package in interested tabancas roughly according to the following schedule:

1985 - 5 tabancas  
1986 - 15 tabancas  
1987 - 20 tabancas

## 2. Activities

- a) By the end of 1986, water control structures and improved techniques had been implemented in 14 bolanhas. Of 267 hectares surveyed, dikes were worked manually by the farmers on roughly 150 hectares. There is some evidence that farmer participation was slightly better the first year than in 1986; however, late arrival of inputs (U.S. provided fertilizer did not arrive until the crops were being harvested) and lack of fuel impeded second year activities. Yields averaged 2.8 T/ha in 1985 and 2.3 T/ha in 1986.
- b) Because farmer participation had been less than adequate, the technical team/DEPA decided to continue working with the present participating villages in 1987, adding only one or two new villages to the program. Efforts were to have been concentrated on completing dikes from the last two years and on producing properly-functioning water control systems before expanding the technology to new areas. This would also enable the extension service to assist the villages adequately in their dikework. However, the bolanha development team surveyed six new areas for 1987, and DEPA constructed the dikes with little expectation of further farmer participation. Participating bolanhas, therefore, have been increased to 20 for the 1987 agricultural campaign (an estimated 400 hectares).
- c) Extension agent-managed fields were introduced for the first time in 1985, and these also served as on-farm trial sites. Plots managed successfully by the agents were used as demonstration plots. Attempts were made to introduce improved practices such as line planting, reduced use of fertilizer, rotary weeder, etc., which were demonstrated through the above-mentioned plots. During farmer field/study days, the above plots, together with well-managed farmer fields, served as illustrations to educate the villagers as well as extension agents.
- d) A residual moisture-based sequential cowpea crop was successfully introduced on a trial basis in the basfonds of Tantacosse. Such trials could be expanded to similar basfonds carrying plenty of residual moisture into the the dry season after rains.

3. Constraints:

The bolanha development wing began surveying new areas to be included in the 1987 program when older villages failed to produce timely advances for tractor fuel. While cash advances for dikework cannot be strictly interpreted as indicating interest in the program, it is at least a first step in producing water control structures on their land. Manual completion of their dikes is a necessary second step, and this area has been chronically weak as well. (Reasons for non-participation are outlined in section III of this report.) If efforts to enforce dikework in 1987 are fruitful, it may be noted that the improved water management techniques have been "successfully introduced". The question remains as to whether or not they will be maintained. Although there are indications that some villages are beginning to appreciate the benefits of improved practices, eligibility to purchase agricultural inputs still appears to be the strongest incentive to dike construction. There was simply not enough time to draw any conclusions as to the impact of this project in the area.

The agents were, in general, better-skilled in 1986, but the program continued to suffer from problems of motivation. For these reasons, the demonstration fields globally are not yet having the anticipated impact, though the potential is quite good.

4. Outcome:

The technical team in collaboration with DEPA considered it more important to concentrate efforts on producing well-functioning water control systems before expanding the program to new areas. The program, therefore, operated in the following bolanhas between 1985 and 1987:

1985 - 10 bolanhas  
1986 - 14 bolanhas  
1987 - 20 bolanhas (assuming time to finish  
dikework in 1987.)

Farmer participation continues to be weak, but there are some indications this may improve with economic policy reforms\* and continued exposure to the new agricultural techniques.

\*The peso was devalued in April 1987 and the controls on rice prices lifted. Free market rice prices are nearly five times greater than controlled prices.

Extension agent-managed fields have been implemented in all DEPA-assisted villages. These fields are not yet having the anticipated impact (section I.C.3), but potential is high.

B. Output: Improved management capacity of DEPA in providing services to farmers.

1. Objectively Verifiable Indicator: Successful replication of technical package beyond the demonstration plots in each tabanca, in coordination with inputs being supplied by DEPA.

[Note: See Outcome, below, relating to this indicator]

2. Activities: (For specifics on items cited, see Quarterly Project Progress Reports 1985 and 1986)

- a) Pursuant to a DEPA-originated restructuring design recommendation by the project team, the extension service has been restructured to include a more efficient supervisory hierarchy. Reporting systems have been created for field agents. A workable structure now exists with appropriate sanctions to improve discipline. An efficient farmer contact methodology based on the "training and visit" system was introduced. Materials and equipment are on order.
- b) The topography department, organized early in the project, continued to benefit from training programs and intensive field work. Three teams now exist, including surveyors and aids. One of the participants finished a six-year program in soils and water management at Texas A & M University and has returned to supervise the topography section. Equipment and supplies have been ordered.
- c) A credit department has been created for sale of agricultural materials to farmers. Personnel were identified and received training in bookkeeping and credit monitoring. Record keeping systems have been put into place and monthly reconciliations have been institutionalized.
- d) The central warehouse and all sector warehouses were organized and routine inventories established under the direction of the chief accountant of the credit department. Stock clerks were trained, stock

cards created and requisition and control systems established.

- e) In an effort to improve coordination among the different departments of the station, the project proposed various means of improving programming and collaboration at the center. A technical liaison person was suggested to coordinate research and extension functions, a weekly vehicle and equipment programming system was recommended, and pre-campaign technical coordination meetings were tried.
- f) The project undertook support for DEPA's small "Center de Formation," and contracted the services of a training coordinator for several months. Supplies and equipment have been ordered for the center.
- g) Gross inequities in the DEPA pay scales have posed major problems in terms of motivation and integrity in the extension and credit divisions. The project, therefore, recommended a series of pay scale reforms, which were recently accepted.

### 3. Constraints:

Skill levels at the station proved to be much lower than had been anticipated. Training expectations, therefore, were lowered significantly during the course of the project; considerably more time would be required to raise basic skill levels, particularly literacy and numeracy. (Extension agents, in general, had higher basic skill levels but were still in need of remediation.)

Control and management systems established require the support of the DEPA leadership in order to continue. Although the staff has become more management-conscious, it is not clear whether sufficient change has occurred to guarantee that these functions will continue.

Few of the improved programming attempts were accepted. Reasons were always unofficial when they were furnished: Because technicians must also attend to their own survival needs at the station, they are reluctant to impose controls on machinery and other resources; low salaries of mid-level personnel (\$12-15/month) make them unreliable links in hierarchical chains of responsibility; higher-level technicians are frequently rewarded with unexpected "incentive"

trips abroad, diminishing their supervisory effectiveness; GOGB/Bissau often requisition commodities or equipment for other purposes and local technicians are badly viewed if they do not cooperate.

Although pay scale adjustments for extension personnel were eventually accepted by DEPA, USAID provided additional funds for this purpose. It is doubtful that this can be sustained by DEPA. (See Section III.)

Because of national retrenchment policies, the extension department is likely to lose some of its personnel during the next year. As it is presently operating with the barest minimum of staff, this would seriously affect the field operations.

The credit program faced numerous difficulties which are summarized in Section V.B.

4. Outcome:

The Objectively Verifiable Indicator proved to be an inadequate measure of Output attainment. Although specific techniques (e.g., line planting, rotary weeding, etc.) have been adopted elsewhere, there has not been replication of the total technical package beyond the demonstration plots in the bolanhas. Indeed, efforts are still being made to encourage farmers to participate in completing their dikework for the last two years (Section I.A.). New villages are continuously asking for admission to the program, but this probably reflects a desire to qualify for agricultural materials available only to participating villages. The successful replication of the technical package, beyond the demonstration parcels, also involves complex issues of farmer participation (Section III).

In order to improve DEPA's provision of services to farmers, the project tackled numerous areas in need of improvement in the management of the station itself. Although many changes have been accepted by the station management, more time and exposure to management principles are needed before these improvements can be reliably sustained.

Resistance to management systems and controls can also be attributed to the lack of skilled mid-level personnel at the station, macro-economic realities that necessitate a certain leniency in

accountability, frequent and abrupt departure of higher-level technicians for study trips abroad, and reluctance to allow outside input in internal policies.

The GOGB has just begun initiating significant policy reforms and the project has supplied a base upon which DEPA can build in improving its management. The National Project Coordinator, trained through the project, should contribute significantly to continuing management improvements at the station.

C. Output: Trained extension agents serving area farmers and an extension system in place.

1. Objectively Verifiable Indicator: Forty extension agents were given basic extension methods training course as a result of the project technical assistance and project-provided supplies.

[Note: Although the project had originally trained the 40 extension agents, given DEPA's means, the number of agents placed in the field was necessarily reduced to 24.]

2. Activities:

- a) The extension agents have been screened and new agents recruited in order to upgrade the extension service. A major reorganization of the extension service was done and an efficient hierarchy put into place.
- b) Extension agents have received formal and on-site training in demonstration fields, in the collection of data, simple field trials, improved agronomic practices, land development and water management. Training courses for extension agents have been designed and implemented. A preliminary reference text was produced for the benefit of the extension agents.
- c) Farmers groups have been reorganized to permit farmer input into the extension program and to contribute to ongoing monitoring of the extension agents' performance.
- d) A cyclic work reporting program has been established for extension agents in order to improve extension services to farmers.

e) Study trips were planned for promising agents and selected farmers from the best villages. These were meant to serve as an incentive and to provide exposure to their cropping systems in neighboring countries.

3. Constraints:

Skill levels and experience were very low, significantly affecting the training program.

Living conditions in the villages and low salaries affect the motivation of agents and tend to exclude the better candidates. (Better educated candidates can earn higher pay in other governmental services or with other development projects.)

Agents, of necessity, must receive much of their training on the job; thus, often lowering their credibility with farmers. (Extension agent-managed fields, for example, may not necessarily be as good as a model farmer's fields.)

Due to administrative problems at AID/Bissau, none of the study trips took place and extension and training materials had not yet arrived at the end of the project.

Motorcycles, imperative for supervision of agents in the field, were not delivered until the end of the project.

4. Outcome:

The extension division has been reformed and a supervisory hierarchy created. Twenty-four extension agents have been recruited, screened, and trained in improved agronomic practices, land development, water management, and demonstration fields. While skill levels are not as high as desired, the agents are now providing better services to the farmers.

The extension program is still suffering from lack of materials and equipment but these materials should soon be arriving from the U.S. Supervision of agents should improve as the Extension Supervisors receive their motorcycles.

Through the implementation of workplans and reporting procedures, the Extension Chief is now better able to monitor the field activities.

As the Bafata project will soon be coordinating extension programs in the region, it is possible that DEPA salaries will be readjusted to correspond more closely to those of other services, thereby reducing motivation problems among the agents.

D. Output: Experimental farmer associations supervised by DEPA technical personnel

1. Objectively Verifiable Indicator: Existence of rudimentary farmer association (maximum of two) providing organized support to farmers.

2. Activities:

Much time was spent with the village leaders in order to gather important input on their needs and wishes. Gains were made in promoting farmer feedback into the extension service through assistance in monitoring and evaluating their extension agents. Some gains were made in introducing group responsibility for credit collection.

3. Constraints:

The GOGB requires village outreach programs to pass through the officially organized "Comites" that exist in all villages. They are not amenable to the introduction of alternative associations at this time.

Efforts to shift responsibility for operations to the farmers were frustrated as tradition and lack of economic incentives for rice production did not encourage whole-hearted farmer participation.

DEPA technical personnel are just beginning to supervise their own teams and to coordinate their own activities. It will likely be some time before they are prepared to assist the farmers in this respect.

4. Outcome:

Through the introduction of shared responsibility in extension agent monitoring and credit duties, the "Comites" are accepting a more active role in the extension program. Much remains to be done in this regard; however, it should be possible to build on this base in the future if the GOGB decides farmer associations would be appropriate.

E. Output: Provisional Geba River Valley Development Plan drafted.

1. Objectively Verifiable Indicator: Provisional Development Plan completed for consideration by the Ministry of Agriculture.

2. Activities:

No actions were taken on this issue, aside from initial discussions with AID and DEPA, for the reasons outlined below.

3. Constraints:

Neither AID nor GOGB was able to deliver essential input and support to the project. The country itself was paralyzed for months at a time; all operations halted for lack of fuel. Assisted villages routinely suffer losses when inputs upon which they rely do not materialize (fuel for pumps, seed) or services are ruptured (crop protection, etc.).

Despite continuous interaction with participating farmers, the project was unable to elicit an acceptable degree of village participation. It seemed apparent that certain assumptions upon which the project was based (farmer interest in rice production, economic incentives) were not valid; yet, there was not enough time to assess possibilities once GOGB policy reforms corrected possible disincentives. A major socio-economic survey addressing key issues must be conducted before a meaningful development plan can be undertaken for the Geba River Valley.

4. Outcome:

Because of the severity of macro-economic and logistical problems and because the technical team was still unable to make a judgment on the progress of present efforts, all parties (technical team, AID, and DEPA) felt it unwise to undertake recommendations for a global development plan for the region at this stage.

F. Output: Trained topographer's aides and rural engineering staff.

1. Objectively Verifiable Indicator: Three two-man teams of topographers/surveyors trained.

2. Activities:

- a) In 1985, a topographer was contracted for three and one-half months to upgrade the skills of the topography team. Twelve topographers were given intensive training in survey techniques and beginning design room skills. A second topographer/trainer was contracted for an eight-month course beginning in December, 1986, but lack of logistical support and ill health obliged him to terminate his contract after two weeks.
- b) The topography team received continuous on-site training through the bolanha development program. After four years of assistance, they are able to work with minimal supervision.
- c) The survey crew has been increased to 18, including 4 topographers and 14 aides, making up 3 work teams. The surveyors are also instrumental in assisting farmers and extension agents in manually completing dikes in the bolanhas; and in 1986, they assisted extension agents in setting up the demonstration parcels in participating villages. When they are not involved in bolanha work, they are employed on DEPA experimental fields.

3. Constraints:

Training has not been as extensive as hoped. The Chief topographer should have a proper training course at a technical school in Portugal, as requested by the DEPA. Design room skills are particularly weak in the crew, including basic mathematics, but this will require lengthy training.

Despite the creation of three survey teams, to date DEPA has not provided the necessary support commodities (fuel and food supplements) to field all three teams.

With the exception of the chief topographer, the team leaders are as yet unable to do design and drafting without supervision. (It is hoped that the chief topographer will be able to continue their training once he has completed a formal training course.)

4. Outcome:

Three survey crews have been trained, including four topographers and fourteen aides. The personnel have benefited from four years of technical assistance and are able to conduct field work with little supervision. Skills are still somewhat weak; however, and further training should be provided for the chief topographer.

Although this goal has been met, DEPA is experiencing difficulties in fielding all of the teams. This problem is being addressed by the new chief of this department, recently returned from the U.S. training.

**III. Issues in Project Design**

The technical team understands that the redirection of the project in late 1984 was a valid effort to more productively use remaining time and funds. Hence, "project design" is hardly appropriate in connection with phase two. Nevertheless, there are a few issues and assumptions that would be prudent to review in light of the last two years' experience.

A. Farmer Participation/Technology Level of Intervention

1. Assumption:

The PP Supplement promotes labor-intensive dike construction on the grounds that heavy machinery is non-sustainable. It states that men will have to be involved in the initial construction of water control structures, that considerable labor will be required each year just to maintain existing terraces and dikes, and it acknowledges labor constraints in the villages. It expresses hope that after the first campaign villagers will be sufficiently motivated by the increased yield to increase their labor investment.

The PP Supplement wonders if the villagers will be willing to make the additional labor investment, and "at what cost?"

2. Issue:

In terms of project implementation, this was a "catch-22". Villagers must see increased yields before they can decide to invest additional labor.

The labor investment must be made before they will see increased yields.

- a) Are men willing to assist in initial dike construction?
- b) Are women willing to increase their labor in annual maintenance of dikes?

3. Observations and Recommendations

The first question was answered in the first year of operation (1985) in word and deed. Men are unwilling and unable to sacrifice time from their own fields for this purpose. In order to address the second question, the project (Aurora team/DEPA) requested AID to reconsider the use of tractors in initial dike construction. AID provided these for the 1986 campaign. Villagers pay for their own tractor fuel and are obliged to complete the dikes manually, but this would not entail much more labor than annual maintenance. Yields have increased as a result of the improved technology, but participation of the villagers in completing/maintaining their dikes has remained weak.

It has become clear that many factors, in varying degrees, are influencing farmer participation. Traditional cropping systems, women's labor constraints, economic disincentives, exclusion of women from village meetings, and many other factors are affecting the adoption of this new technology. It is too soon to answer the second question.

Because of men's labor constraints, the project could not continue to badger them into participation on the dikework. Tractors for initial dike construction could be included in DEPA's package of services provided to farmers, and as such be "replicable". They are no less sustainable than any other component in the DEPA extension program.

B. Project Coordinator Counterpart

1. Assumption:

The PP supplement assigns the Project Coordinator as counterpart to the DEPA/Contuboel Director. The Director is charged with coordinating all of the various station activities, and management of their internal operations and administration. The PP supplement assumed that the Project Coordinator would assist in developing more effective manage-

ment and delivery systems in carrying out DEPA's mandate -- presumably including general management of the station and the coordination of its various technical activities.

2. Issue:

In reality, the Director/Contuboe1 did not accept the global mandate of the Project Coordinator; nor was he willing to accept outside assistance in specifically internal affairs. In addition, the Director has little time to devote to the complexities of the extension component.

3. Observations:

In truth, the extension division -- which the AID project was attempting to assist -- suffered from the absence of a bona fide chief, which would have been a more logical counterpart of the Project Coordinator. With the return from training in the United States of Duarte Luis Sa, one of the AID participants, this situation was rectified. He was designated Chief of the Extension Division and became the Project Coordinator's counterpart. It is unfortunate that this came about only four months before the departure of the technical team.

C. DEPA Extension Program

1. Assumption:

DEPA is a branch of the Ministry of Rural Development charged specifically with experimentation and research. The research and seed multiplication divisions of the Contuboe1 station are assisted by FAO and have had some measure of success over the last ten years. DEPA has recently expanded basic extension activities, assisted by the USAID Rice Production Project. The Project Paper assumes this to be a valid area of intervention.

2. Issue:

There are other projects operating in these same DEPA-assisted villages for the extension of other crops (cotton, peanuts, etc.). It is not unusual to find a variety of extension programs with combinations of different inputs and systems all functioning within the same village. These projects are not necessarily coordinated; efforts are often duplicated and programs are sometimes conflicting. Confusion has often resulted in the minds of farmers who are left to prioritize these

development programs given their own needs and labor constraints. Farmers have tended to interpret this as competition among various suppliers for their time (in exchange for goods!). There is ample evidence of this. The worst producing village in terms of farmer participation in 1985 was the best producer on the peanut project rolls.

The Ministry of Rural Development has recognized this situation and has recently taken measures to consolidate development efforts in Zone 2. The French-run Bafata project is reputed to soon be expanding its operation to include basfonds development, credit, and extension for the entire region. They already have the infrastructure, trained personnel; and management capacity; and they are already working in many of the same DEPA-assisted villages.

### 3. Observations and Recommendations

DEPA is unquestionably overextended. It is unclear why it was decided to initiate extension services at the research station, but it has proven to be somewhat ambitious given the human resources available. One, more sustainable, option for DEPA might be to limit activities and resources to research and seed multiplication, as before, and coordinate more closely with the Bafata program to contribute to their extension service. In this way, research conducted at the DEPA station could be extended to the farmers without draining resources and management at the station.

The present extension department could be scaled down to concentrate better quality service such as in the experimental pump program, as outlined elsewhere in this report.

## D. Total Cropping System

### 1. Assumption

The PP Supplement guides the technical team to assist farmers in improving their total cropping system in addition to direct assistance in improving rice practices in the bolanhas. It assumes there is sufficient time for this.

### 2. Issue:

The project recognizes this as a necessary step in providing assistance to the target population;

however, there was neither the time nor resources to make any headway in this area. What was learned over two agricultural campaigns raised questions about the advisability of encouraging men to participate in the construction of rice levees.

3. Observations and Recommendations

Project "efforts to be responsive to the priorities of the farmers" resulted in the introduction of the tractor for initial dike construction, enabling the men to attend to their own crops. Altogether more time was needed to explore ways in which improvements in rice production can complement and not compete with labor demands in the total cropping system. An appropriate study should have been done before undertaking an intervention in one component of the total system, which, given the project redirection, was not possible.

IV. Project Implementation: Issues and Recommendations

A. Budgeting

1. Issue

When the present technical assistance team arrived, AID had no system for monitoring its own project budget. This was not set up by line item on the RCO computers. The Project Coordinator worked with the AID Project Administrator to unravel past expenditures and ascertain quantities left in line items so that procurement requests could be made. This was a lengthy and somewhat frustrating ordeal that was not completed until project finances were transferred to REDSO and the line items themselves were more closely aligned with the new project direction. AID made an effort to update the project from time to time, but in fact there was not sufficient information exchanged on which to intelligently base procurement requests or program activities (study visits, outside training, etc.).

2. Observations and Recommendations

The AID Project Officer should set aside time when pipeline updates are received to meet with the Project Coordinator so that budgeting might be more of a collaborative effort. This would also allow the technical team to be made aware of project-related secondary activities initiated by

AID/DEPA, Bissau which often impact unexpectedly on field programs.

B. Procurement

1. Issue

Given the short life of the project (two years) and anticipated administrative delays in procurement, the Aurora team did not submit a procurement plan to AID. Once the team was able to identify equipment and supplies needed, a global request was submitted to AID, through the GOGB, including all necessary materials for the entire two years.

Although DEPA/Contuboel signed agreement to the original request for materials, PIO/Cs were not generated until DEPA/Bissau and AID could review the requests together. Lengthy delays were encountered at this point. Further delays resulted from the lack of appropriate catalogues with which to reference items for purchase agents. The longer the delays, the more changes made to the request list. In the end the technical team was uncertain as to what materials had actually been ordered. Some equipment trickled in during the latter part of 1986, but the bulk of supplies and materials have yet to arrive. The project essentially ran itself from a petty cash fund created for minor operating expenses such as vehicle repairs; from a corporate petty cash fund established by Aurora, and by the expenditure of personal funds by the Aurora project team staff.

2. Observations and Recommendations

AID/Bissau is not able to attend to the complexities involved in identifying, purchasing, and delivering commodities needed in the field. This would be more appropriately handled through the contractor wherever possible. The GOGB and the project technical assistance team should jointly generate commodity requests; and if, for any reason, there is a need to alter items, this should be done in collaboration with project personnel.

C. Use and Control of Materials and Equipment

1. Issue

Commodities purchased with project funds are routinely turned over to the GOGB with the expectation that they will be used for project purposes. However, DEPA tends to view its

activities globally; and AID project goals are not always given priority. For field personnel this has meant serious compromises in the program over the last two and a half years. Some activities and training programs have not been completed. TA's have spent much time in efforts to overcome non-availability of commodities. Additional project funds were often required to duplicate purchases used for other DEPA activities. Many of these difficulties stem from acute and chronic management problems at the Center (addressed below). The technical team dealt with this problem by attempting to establish management and/or control systems at the station and by negotiating directly with FAO for resources needed by AID and FAO programs. While these efforts had some measure of success, it is clear that much more management training is needed by DEPA personnel, and that it will be some time before control and programming functions at the Center will be reliable.

2. Observations and Recommendations

If project personnel do not have access to commodities necessary to the work for which they are held accountable, project goals are compromised, TA's are overextended, and undue strain is put on TA/DEPA relationships. We would suggest a clear and official policy regarding commodities purchased for the project, signed in advance by both governments. Equipment and supplies that are necessary for the realization of project goals should be under the control of the technical team until the end of the project at which time they could revert, as per AID policy, to the host government.

D. Time Constraints

1. Issue:

The project was redirected in late 1984 following a REDSO evaluation. A new technical team was brought in and given the remaining two years in which to accomplish a great deal. In fact, technical assistance was extended an additional seven months in order to consolidate gains made as of the end of 1986. Most projects attempting any kind of significant changes expect to invest 5 years of work to those ends, though 10 years has proven more realistic. In fact, technical personnel were spread so thin that the project was neither able to assess progress in the bolanhas nor to complete training programs.

## 2. Observations and Recommendations

A lesson learned: If there are only two or three years with which to work, it is inadvisable to attempt field activities in Guinea-Bissau. It may have been more useful to concentrate on training and institution building within the DEPA/Contuboel framework.

### E. GOGB Personnel

#### 1. Issue

GOGB technicians at the project site are clearly doing their best to make the Contuboel operation work. One very basic limiting factor, however, has not been adequately addressed by either AID or the GOGB, yet it has proven to be the project's most overwhelming problem to date. There is a very serious lack of management skills among the Contuboel leadership that impacts on every aspect of the operation. Technically qualified staff lack knowledge of fundamental management principles; yet, they are called upon to administer and coordinate the numerous activities of the Contuboel station. Hierarchical chains of command, programming, and coordination are not respected, record keeping is considered a nuisance, and discipline is lax. In such an environment, control cannot be maintained and disorganization is the general rule. Resources at the center are not totally absent. Yet, because of the chronic management problems, the station functions continually in crisis conditions.

It must be stressed that the Contuboel management cannot be faulted as they do not understand the need to organize themselves. Compounding this problem is the dearth of skilled mid-level technicians and administrators at the Center, thus making delegation of authority difficult. Technicians in both the AID and FAO projects have taken significant steps in establishing management and control systems, but these will remain largely ineffectual until local technicians respect and learn to implement them. By far, the greatest contribution of technical assistance at Contuboel to date is in the creation of "management consciousness"; yet, this must now be elaborated before much headway can be made in any of the Center's activities.

## 2. Observations and Recommendations

A major lesson learned is that the extreme dearth of management skills must be addressed before DEPA will be able to provide sustainable services to farmers. In considering further field activities, AID should seriously consider assisting the GOGB in building its own institutional capabilities -- basic management training for technicians in supervisory and management positions. It is difficult to adequately convey the seriousness of the problem and the importance of this recommendation.

One important resource DEPA now has is Duarte Luis Sa, recently returned from participant training at the Texas A & M University. In addition to his technical training, he has gained significant management skills, and DEPA should employ these to the maximum until more of its leadership can be trained. Unless he is placed in a significantly powerful position, there is risk that these valuable capabilities will be diluted by present practices, or that frustrated attempts to effect change will weaken his resolve to continue.

### F. GOGB Inputs

#### 1. Issue

The project design assumed certain contributions to the project by the GOGB. Among these obligations were salaries of DEPA employees and fuel and oil for project vehicles. It is clear that the GOGB does not have the means to meet these obligations. In the last two years, AID has provided supplementary funds (PL-480 reflows) for salaries of extension personnel and gasoil to run the Contuboel station. At one point, DEPA was unable to pay utility bills that were several months in arrears and solicited help from AID. Personal and petty cash funds have been repeatedly used to purchase fuel and oil to run project vehicles and food supplements for the topography team.

#### 2. Observations and Recommendations

There are no indications that this situation will improve significantly, as the country is presently initiating new retrenchment measures. Future USAID field projects should be based on the realization that the GOGB does not have the means to significantly contribute to the operation. Budgets for the most basic expenses should be built into the project from the beginning. In

this way, expectations will be more realistic and activities will not be jeopardized by the lack of inputs when needed. Relations between the technical team and DEPA staff will also be safeguarded.

G. Training

1. Issue

Training, both long- and short-term, was planned for DEPA technicians during this last phase of the project. There appeared to be an administrative block at the AID/Bissau level, both in the mechanics of arranging training and in appropriating funds for this purpose. Even study visits planned for sites in Senegal were bogged down; at one point, it was suggested that the project use its petty cash fund to finance this as well.

2. Observations and Recommendations

It is the consensus of the technical team that the most productive contribution this project could make to the DEPA, and consequently to the farmers, would be to provide further training for personnel at the Center. Although the status of the pipeline has not been made available, it appears that there are considerable funds left in the project. If this is the case, it is recommended that AID seriously consider an extension of the project and redirect all remaining funds into training for the people listed below. Two of these candidates are upper-level technicians while the others are mid-level.

3. Long-Term

- a) Malam Sadjo, Director DEPA/Contuboel. (Educational background: High school graduate and two years of technical college in agronomy.) He has requested a program in water management, Texas A & M University, for a degree in Hydraulic Engineering. He should also receive basic management courses.
- b) Duarte Luis Sa, Chief of Extension Division (National Project Coordinator). (Educational background: B.S. in Soils and Water Management at Texas A & M.) He has requested to return to Texas A & M to continue his studies for a Masters degree in Agricultural Engineering.

- c) Armando Sambu, head surveyor in topography section. (Educational background: Six years of school.) He should receive training in elementary mathematics, design room technique, topography, and management. This should be done in Portugal or Brazil.
- d) Dona Quemabi, Extension Coordinator. (Educational background: Seven years of school.) He should receive training in agronomy/extension in Portugal or Brazil (Brazil is reputed to have the better extension service). This could be done at an agricultural technical high school, if possible (perhaps a two-year certificate). He should also receive basic management courses.
- e) Quetinha Lima, candidate for Chief Accountant, credit section. (Educational background: High school graduate.) She should receive training in bookkeeping, rural credit, and management at a technical college in Brazil or Portugal.
- f) Jose Luis da Silva, assistant topographer. (Educational background: High school graduate.) He should be trained as a Soils Specialist at a state university--Louisiana or Arizona.

It has been suggested that these people receive language training at the college they are to attend and not in a special program.

#### 4. Study-Visits

Study-visits to neighboring African countries have been requested by DEPA for the last several years. AID has agreed to these, but was unable, administratively, to set the ball rolling. It is recommended that these trips take place as soon as possible, to both widen horizons and provide incentive to mid-level technicians at the Contuboel Center.

- a) Burkina-Faso: to study dike systems used for holding rain water.

Participants: Five best topographers; and Duarte Luis Sa.

- b) SAED in St. Louis, Senegal: Visits to farms to see improved hydraulic systems, exchange experiences with SAED technicians.

Participants: Dona Quemabi, Extension Coordinator; two extension supervisors, five best agents, and five farmers.

This trip could be made in the mini-bus.

#### 5. On-Site Training

If DEPA decides to continue its credit program, technical assistance should be sought for the credit bookkeepers, as they are in need of repeated practice in basic arithmetic and implementation of the credit system. (For background, see quarterly credit reports.)

One option is to create a training center at the Contuboel station and seek technical assistance to staff this school. There could be teachers for the different disciplines, including bookkeeping, topography, extension, and management. This would necessitate, however, a continuation of technical assistance.

#### H. Support of Technical Team

##### 1. Issues:

It is not easy to support and backstop a technical team in an area such as Contuboel. Nor would it have been possible to anticipate all the difficulties, given the special conditions existing in the country. The more serious issues are dealt with here as they might be useful in planning future development activities in Guinea-Bissau.

- a) AID/Bissau currently does not have the administrative capability nor the staff to manage an active field project. This impacted on virtually every aspect of project implementation, from supplying required resources to the team to contractor safety. AID contracted with Aurora Associates to provide technical assistance only, while reserving management of the project. The technical team, thus, served as a buffer between AID and DEPA, lacking authority to take actions that would have facilitated meeting of project goals.
- b) AID's policy of turning project-funded commodities over to the GOGB (addressed above) left the team virtually without jurisdiction over needed materials. The

inability to act on procurement requests, study trips, and other important work-related issues further eroded technical team credibility. AID's failure to coordinate with their assistance team on budgetary matters, short-term consultants, and policy issues (DEPA/Contuboel and Bissau were often invited to AID project meetings of which the team was not even aware) did little to strengthen the team's credibility. In the end, the team's technical contributions alone enabled this unit to maintain any kind of advisory role -- but it is an entirely untenable situation in which to place a technical team.

- c) The project did not have a consistent contact person at AID with whom to work. The roles of the AID staff connected with the project were fuzzy, yet complicated. While everyone did his best to lend a hand, no one was really sure of his responsibilities to the project. Attempts by the team to clarify this issue simply resulted in more elaborate and complex AID staff role definitions. This contributed significantly to the lack of follow-up and communication impasses.
- d) AID insisted upon retaining responsibility for providing support services for the contract team, although this was unrealistic as work-related backstopping proved to be. Freezers in which to stock food, electricity to run freezers and pump water, and a plethora of related essentials were consequently furnished and paid for by team members. Because the GOGB was reluctant to spend project funds on a generator for the technical team, team members installed one at their own expense so that they could remain on-site. Support functions, therefore, fell back upon the contractor, or team members, despite AID's refusal to contract them, and cash was continuously advanced to AID for these purposes. Although compensation was eventually arranged for some of these expenditures, the fact remains that AID was incapable of providing the necessary support.
- e) Mission "regulations," meant to guide personnel in Bissau, were imposed upon, and not adapted to, realities in the field. The project is located at an agricultural station where telephone communication, roads, health facilities, and often food are non-existent.

One works and lives with the same group of people. Team members were allowed to bring families with infant children to this area. Yet, the team was instructed to remain continuously on-site, discipline that was imposed only on AID project technicians at this station. When it was necessary to leave the station for any "personal" reason, team members were charged 50 cents per mile for use of official vehicles; thus, a child's visit to the health unit in Bissau would cost a contractor \$120; the nearest phone is "\$22" away. The technical team was, thus, made to feel that their physical and mental health was not a consideration in AID project policies, and the Aurora Chief of Party was invariably attempting to protect team members from unreasonable interpretations of regulations. This did little to promote good working relations with AID.

## 2. Observations and Recommendations

- a) Given their administrative capability, AID/Bissau's attempt to manage a field project was unrealistic. As suggested by Aurora during the initial phase of the project, AID could have contracted management functions, including general procurement, reserving a monitoring role which is within its administrative capability. The technical team would then have been freed to provide its own work inputs and support services through its home office or locally, when possible; and AID would not have been obliged to borrow funds from Aurora or Aurora staff.
- b) AID should designate one single Project Officer to handle any one project, and this person should coordinate closely with the contractor Chief of Party. Fixed meetings should be strictly respected.
- c) A technical team must be able to feel that it is working in collaboration with AID and the GOGB for common goals. This will not happen if their welfare is sacrificed for these ends. The GOGB does not always know or understand expatriate needs; thus, it is AID's duty to insist that certain conditions be met if technical assistance is to be provided. Given the management problems that exist in Guinea-Bissau, the technical team must be allowed to control resources needed for its well-being (fuel for generators,

etc.). If families are permitted to accompany contractors, provisions must be made for their health and safety. AID should encourage and authorize technical assistants living in restrictive conditions to leave their post periodically for a few days of "local R & R," such as long weekends, holidays, etc. Technical assistants should not be financially penalized for attending to health or survival needs in rural areas.

V. Technical Recommendations for Continuation of Activities at Contuboel Station. (For DEPA)

A. Bolanha Development

1. Status

The present survey/development team consists of ten people plus the chief surveyor and the hydraulics technician. This team consists of one surveyor, one rod man, four stake men, two tractor operators and two assistants. Two additional survey teams (six people each) have also received training during the course of the project. From 1984 - 1987, only one team was fielded at a time as DEPA did not provide support for more. Team members were rotated so as to provide training for all. With the provision of the requested additional training, all three teams will be capable of surveying with only spot-check supervision. Each team can survey 1.5 to 2.5 hectares per day, depending on the terrain.

Land development should begin in January and continue through June. Food support required in the past for the 10 man team has been: 30 kg rice and 30 cans (425 g) sardines per week (5-day week). Camping equipment is badly needed to support this team as it is necessary for them to remain on-site.

2. Recommendations

A yearly work plan for bolanha development should be as follows:

July - October: Verify water control in all bolanhas, particularly in new bolanhas in the first year of development. Document any need for improving the water control system.

November - December: Assist extension with harvest control/yield measurement. With extension

and credit wings, develop work plans for the next campaign. If extension agents are capable of assisting additional villages, a list should be made and new areas verified for feasibility.

January - June: Survey of contours and canals as needed. Tractors plow survey lines and provide loose soil so that villagers may complete dike construction manually.

Additional recommendations include:

- a) Further training should be seriously considered for Armando Sambu, Chief Surveyor. (See Section IV.G.) On-the-job training for other surveyors would be beneficial.
- b) In order to more productively extend the new techniques to the farmers, further training will be required for the extension personnel. Future training should be combined with a research component, particularly on-farm research.
- c) The present MF 290 (75 HP) tractor was recommended in coordination with the FAO program as parts are interchangeable; however, it is too small for the levee plow. A larger tractor of 100-150 HP would best serve bolanha development needs, if parts are available in Senegal. Donor assistance will, in any case, be required to continue this program.
- d) Several soil samples have been taken during the course of this project, but analysis has not been possible. This should be a priority for the future. This is possible in Senegal, but it is costly.
- e) Small bridges were constructed in 14 villages to improve access to farming areas. Of necessity they were built using wooden boxes for culverts as a short-term solution. Once these collapse, they should be rebuilt with concrete and reinforced steel. At least two metric tons of cement would be required. Additional stocks should be calculated as new areas are developed.
- f) DEPA has been unable to program the resources and equipment needed to support its bolanha development component. It should either designate an individual to fill this role at the station, or the extension department

should control the resources necessary to the village work. If this problem is not addressed, field work will not be possible without outside assistance.

## B. Credit Program

### 1. Status

DEPA requested AID to provide agricultural materials for distribution to farmers. AID agreed to this on condition that adequate control could be maintained at the Center. A control and sales program was thus established through the project and, at the insistence of DEPA, incorporated all materials for resale to farmers regardless of donor.

Credit monitors have been trained for each zone, corresponding to the Extension Supervisor positions. The Contuboel monitor was replaced by a more suitable candidate, but the Sonaco zone monitor is still having difficulties (lack of interest, initiative) and should eventually be replaced. The present stock clerk is intelligent and capable of the work; but he, too, lacks interest. His absences result in chronic discrepancies in the stock records. A chief bookkeeper was trained over two years to supervise the credit monitors and to keep the sales journals. A second bookkeeper was later added to handle the individual village accounts. Both of these bookkeepers were recently suspended for selling credit commodities at inflated values to a local merchant.

The project Coordinator provided preliminary training to three replacement bookkeepers in the final weeks of the project.

NOTE: Problems encountered in attempting to implement a credit program at Contuboel were overwhelming. Credit personnel were too few in number (lack of DEPA finances), poorly motivated (low salaries), and lack of transportation (motorcycles) for village work. Lack of a separate warehouse facility for credit materials made it impossible to adequately control their disposition. Chronic management problems at the station made it virtually impossible to deliver inputs to the village on time, as trucks, fuel, oil, and laborers were in short supply. Skill levels are exceptionally low at the Center, and bookkeepers were called upon to function as professionals while simultaneously learning basic

arithmetic. Low, chronically late salaries of credit personnel and extension agents (\$12-15/month) provided incentive to dishonesty, and the chief accountant eventually spent 50% of his time unraveling cases of disappearing funds at the village level. In the end, a separate fund was necessarily created to furnish loans to extension personnel in the hope of discouraging unofficial "borrowing." As of June, 1987, however, the credit department was effectively shut down when the bookkeeping staff was suspended for profiteering, leaving two ineffectual credit monitors in the department. In July, 1987, three replacement bookkeepers and one credit monitor were hired and "trained." However, significantly more training is required if they are expected to operate the Credit Program.

In addition to logistical and administrative difficulties, the credit program suffered from macro-economic problems as well. GOGB over-valued currency and lack of commodities in country prevented a credit fund from revolving. Farmers, used to free agricultural inputs provided by DEPA, were slow to adjust to demands for payment for these same materials. The lack of a coordinated regional credit service often resulted in two or three different credit programs operating in the same villages, associated with different development projects in the area. These proved to be overwhelming constraints to the implementation and sustainability of a credit program in Contuboel.

## 2. Recommendations

- a) Credit personnel require much more education before they will be able to maintain sales and stock records. The personnel are not yet ready to manage cash sales without close supervision. Bookkeepers should have at least high school education. DEPA should select a candidate to be trained abroad at a technical college in bookkeeping and rural credit theory, to function as the Chief Accountant and supervisor.
- b) A separate facility with adequate inventory control should be constructed for storing commodities to be resold to farmers.
- c) DEPA should not be attempting a rural credit program in this area as management is already overextended in attempting to manage programs at the Center itself. As DEPA is determined to continue its off-season irrigated

campaign, for which definite inputs are required, it should limit its credit program to these villages and to commodities necessary for this work.

- d) If DEPA would like to provide credit services to other villages in its zone, it should work more closely with the Bafata project which now has a mandate to coordinate extension/credit services in this region. Bafata has the infrastructure and administrative capability to effectively serve the farmers.
- e) The Dutch have a management training program in operation in Guinea-Bissau, whose regional representative is based in Bafata. DEPA should actively exploit this resource to provide further training for its credit staff and for interim follow-up supervision. For longer-term training of its credit personnel, however, a live-in technical assistant should be sought for at least three years.

**APPENDIX I**

**Final Technical Report on Bolanha Development**

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July, 1987

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## I. Introduction

The Rice Production Specialist arrived in April 1983. Field trips began to various sites in the Contuboel area chosen by DEPA to procure areas that would be acceptable to construct small dams (manually) to create small reservoirs during the rainy season. Water stored in these reservoirs would be used for gravity-fed irrigation for rice and other crops. During the course of this study, a 10 hectare test plot was developed at the village of Sare Biro. The technique applied was contour dikes used to retain water from rainfall at a level of 10 cm between each contour. In October 1984, a USAID evaluation recommended that the contour system was acceptable. DEPA was also in agreement. It was also decided to discontinue the study for small dams at that time. The "ideal" sites for these dams did not exist, nor did the heavy equipment and gasoil needed for construction.

Production results at Sare Biro were 4 tons per hectare compared to the 600 kg per hectare traditional average. The contour dikes, improved seed, fertilizer, water, and grass control proved to increase production substantially. In 1985, ten more villages were assisted for a total of eleven. The method used to select villages was by request from interested villages stimulated by the test plot results. All areas were surveyed for contours and staked out for villages to begin construction. Extension agents were placed in all participating villages to "live-in" and demonstrate improved farming practices such as fertilizer application, water-grass, and insect control. Animal training for animal traction uses was also provided to all villages that had animals available.

In 1986 three more villages were added to the program for a total of 14. Several other villages were also requesting assistance, but most resources had to be spent on the 1985 sites that had not been completed manually by the villagers. Most areas (85) had to be resurveyed because survey lines had been lost due to lack of construction by the villagers. During the course of the dry season, men were tending their cattle and other business. Soil conditions are very hard for manual-type construction. Once the rains began and created better working conditions, the men were then busy with their cash crops. Because of this major problem, USAID then agreed that tractors were necessary to assist villagers with dike construction. Two tractors (MF 290) and plows were purchased. These tractors were used for two main purposes: 1) to mark contour lines in a manner that would remain through one crop season and 2) provide loose soil for villagers to complete construction. The use of tractors then encouraged farmers to participate more.

In 1987 eight more villages were included for a total of 22. The areas developed during 1984-87 consist of about 444 hectares assisting some 1650 families. Because tractors were made available to mark contours and provide loose soil, and with the availability of agricultural tools, credit, and improved extension training, development moved forward at a more acceptable pace.

## II. Project Goal/Purpose

- A. Goal: To contribute to the stated GOGB aim of food self-sufficiency.
- B. Purpose: To increase food production and farm income of about 1200 small farm families in the Geba River Basin of Guinea-Bissau and to develop the institutional experience and information bases which may enable the farming systems developed in the project to spread beyond the immediate beneficiary universe and be replicated elsewhere.

## III. Accomplishments

- A. Study for Dam Sites (April 1983 - April 1984): Field trips were made to several DEPA-recommended sites to identify areas in which it would be feasible to construct small dams -- manually -- that would store water from rainfall to be utilized for irrigation during the course of the rainy season. It was found that the ideal site did not exist. Some areas could have been dammed but would create problems of flooding areas that were being cultivated. Next was the labor problem. Rice production in Contuboel area is traditionally women's work with the men cultivating cash crops such as corn, maize, peanuts, and cotton. The men were not willing to construct these small dams manually, and USAID was not willing to purchase the heavy equipment needed. By late 1984, DEPA and USAID mutually agreed to put the dam construction goal on a back burner and attempt to establish more acceptable project goals.
- B. Demonstration/Test Plot: In April 1984, a 10 hectare plot was developed at Sare Biro. The area was plowed, diked and the land leveled. Contour dikes were surveyed on 10 cm of elevation with villagers constructing dikes manually. Improved seed, fertilizer, water, and grass control were introduced with a live-in extension agent. Production results were 4 tons per hectare, compared to the 600 kg per hectare traditional average. This 10 hectare area improved rice production for 45 families and was accepted by DEPA as a new project goal with a USAID evaluation recommendation of 1984. During the

course of the project, 444 hectares were developed, assisting some 1650 farm families in 22 villages. Recorded data as follows:

1984 - Sare Biro: This 10 hectare area was plowed, diked, the land leveled, surveyed, and contours marked with tractors. Dike construction was completed manually.

1984

Village	Area (ha.)	Families (Number)	Days of Work Sur. Team (6 people)	Tractor- time (hours)	Gasoil (liters)
-----	-----	-----	-----	-----	-----
Sare Biro	10.0	45	10	112	608

An average of 18 people worked 6 hours per day for 16 days to construct 6300 meters of dikes. Working conditions were "ideal" with loose soil provided by tractors. It is estimated that only 50% would have been accomplished without the use of tractors with some areas doing nothing at all because of extremely hard soil conditions. Once rains begin the men will start work on their cash crops.

1985

Village	Area (ha.)	Families (number)	Days of Work Survey Team (6 people) and/or Tractor Team (4 people)	Tractor time (hours)	Gasoil (liters)
-----	-----	-----	-----	-----	-----
Cutame	7.0	36	5	None	240
Saucunda	28.5	118	19	51.3	
Madina Ioba	5.9	20	4	None	
Waquilare	5.8	30	4	None	
Demba Ure	10.0	34	7	None	
Tanta Cosse	6.3	43	4	None	
Madina Sara	11.3	172	8	20.3	100
Santanto	32.7	115	22	58.8	290
Sare Djaiba	17.5	50	12	31.5	150
Ginane	18.6	54	12	27.9	135
Velingara	5.9	24	4	None	
Total	149.5	696			

1986

Village	Area (ha.)	Families (number)	Days of Work Survey Team (6 people) and/or Tractor Team (4 people)		Tractor time (hours)	Gasoil (liters)
			(same as 1985)			
Saucunda II	25.3	118		13	35.4	175
Bonco	47.8	150		24	90.8	420
Sare Dabel	16.8	65		8	28.5	150
Total	89.9	215				

1985 area expanded in 1986

Demba Ure	6.9	42		4	12.4	65
Tantacosse	2.7	12		4	14.8	75
Sare Djaiba	3.3	10		None	None	-
Total	12.9	64				

1987

New Areas	*Esti- mated		Actual			
Sare Bacar	37.6	150		12	66.3	300
Banghingara	21.3	85		11	31.6	150
Linquinto	26.6	100		7	31.4	160
Sincha						
Boriel	15.5	60		8	41.6	200
Cataba Alfa	13.9	55	40	8	38.3	200
Same Doia	16.0	60	45	5	50.9	260
Cansanti	4.9	20	27	4	40.8	200
Canjai +			36	4	28.8	150
Madina Ioba	10.1	40		3	24.0	125
Waquilare+			36	6	45.2	240
Total	145.9	570				

+ Area not yet calculated  
Canjai 14.0 ha.  
Waquilare 6.6 ha.

\*At the time of this report, extension had not yet provided official list of families in each new area.

1984 - 1986 Area Worked in 1987

Village	Area (ha.)	Families		Days of Work Survey Team (6 people) and/or Tractor Team (4 people)	Tractor time (hours)	Gasoil (liters)
		*Esti- mated	Actual			
Madina Sara	11.3			8	44.1	220
Sare Djaiba	20.4			8	48.5	250
Bonco	47.8			7	41.1	200
Sare Dabel	16.8			5	19.2	100
Tantacosse**	7.1	28	47	4	2.08	100
Sare Biro**	8.0	32		5	31.2	150

Total Area and Families 1984 - 1987

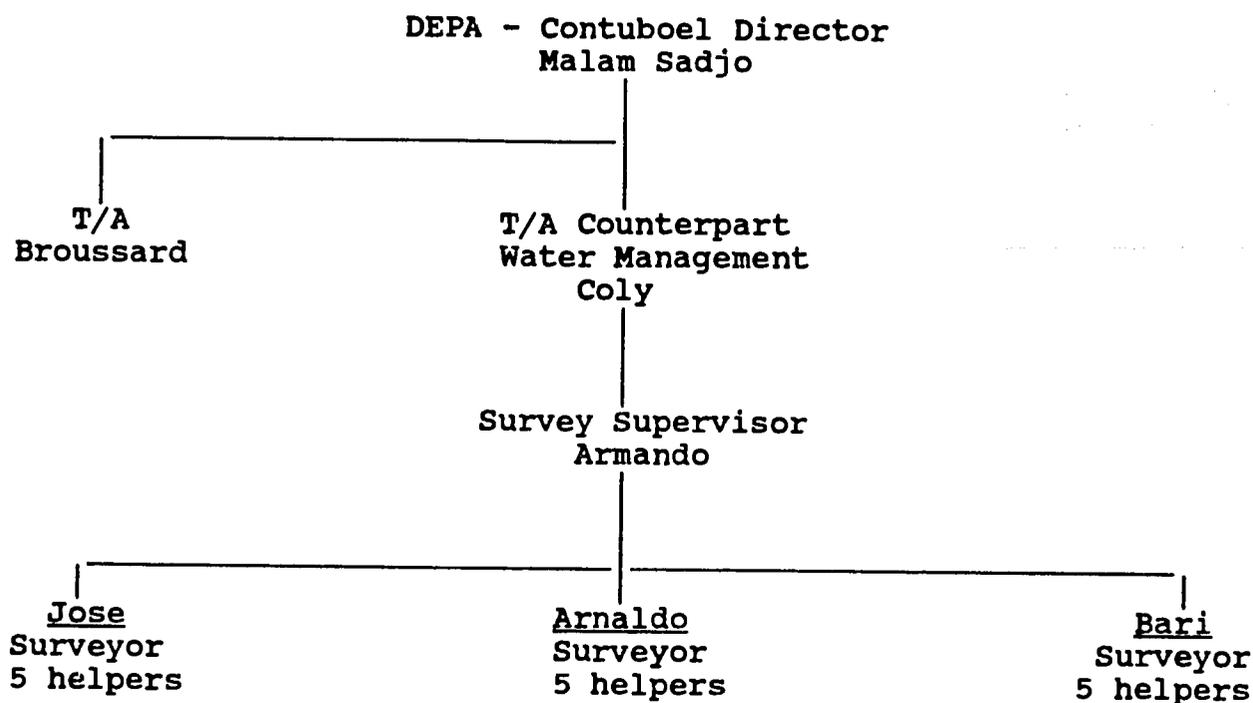
Year	Area (ha)	Families
1984	10.0	45
1985	149.5	696
1986	102.8	279
1987	145.9	570
1987**	35.7	60
<b>Total</b>	<b>443.9</b>	<b>1650</b>

\*At the time of writing this report, extension had not yet provided the official list of families in each new area.

\*\*1984 and 1985 areas expanded in 1987

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Lines of Responsibilities



Recorded Rainfall - (mm.)

	1984 -----	1985 -----	1986 -----
April	0	0	.5
May	75.9	0	98.4
June	251.5	151.8	146.2
July	324.1	172.4	221.0
August	323.9	375.8	381.6
September	318.5	471.6	381.6
November	19.4	0	0
	-----	-----	-----
Total	1313.3 mm	1171.6 mm	1229.3 mm

Yield Average

1984	Sare Biro	4 tons/hectare	With water management and fertilizer
1985	11 villages	2.8 tons/hectare	Same
1986	14 villages	2.8 tons/hectare	With water management and no fertilizer
1986	4 villages	1.8 tons/hectare	No water management with fertilizer

### III. Accomplishments (cont.)

- C. Survey/Development: Surveyors and tractor operators were trained on a day-to-day basis beginning with the test plot at Sare Biro. During the course of development of 1985, 1986, and 1987, surveyors and operators continued with on-the-job training. Before tractors were provided, most survey work was lost because villagers failed to do their part in construction of dikes manually. Once tractors were available, contour lines, canals, and outside dikes were "plowed-up" as soon as the survey was complete on each line. This then created a permanent base for villagers to work from, once their work force was available, without losing survey lines. In some cases, even though villagers did not complete the dikes the first year, the base lines remained to be completed once villagers decided to go to work. This permanent base served to retain water without being completed. As villagers saw for themselves, the areas that were losing water because of lack of construction on their part, they were then more available to complete their dikes.
- D. Animal Training: A team of animal trainers for animal traction was provided by DEPA. Interest was promoted and training sessions were scheduled with all interested villages. Training teams were located in villages that had animals available and worked closely with the owners during the training period. If animals were not used throughout the year, training had to be started all over for the second year by the owners.
- E. Extension Training Models: Water control structures were designed, constructed, and installed to teach improved water control to extension agents. DEPA carpenters constructed wooden boxes to be used for drainage and water control, when needed. Water control heads were installed in areas that required retention instead of simple drainage. These drainage boxes allowed villagers to construct small bridges to improve access to and from developed areas. Villagers also assisted with installation of the wooden boxes. Wooden "overflows" were constructed and installed to teach agents improved water control. The "overflow" allowed excess rainwater to flow out while containing 10 cm within cultivated areas. Sacks of dirt were also used for the same purpose. Project staff provided funds to purchase needed materials for these models; reimbursement was provided by AID only after effectiveness was demonstrated.
- F. Roads and Bridges: During the course of the project several kilometers ms of new roads were opened into developing areas. Several "short-cuts" were opened to

save time and fuel. Existing "trails" were also improved. This was accomplished with a USAID financed bulldozer (CAT D-6). Villagers paid for tractor fuel.

#### IV. Observations

The 10 hectare test plot developed at Sare Biro in 1984 has served as a base of information and infrastructure to accomplish the project goal. The technique of development has served to increase food production in the Contuboel area to the extent that villagers are able to produce enough to have rice available from one crop to the next during the rainy season. Before development began, rice shortages were a major problem. After extensive travel in the Contuboel area, it was evident that several thousand hectares are feasible for development. The technique used at Sare Biro could be used on a national level. Vegetable gardens and other legume crops have also proven to be feasible in rotation with rice. Rice production has traditionally been women's work with the men farming cash crops such as corn, maize, peanut, and cotton besides being major cattlemen and merchants. This has created a major problem with the development process. The women are not able to manually complete dike construction. When soil conditions are right, the men are very busy with their cash crops. During the course of the dry season, soil conditions are very hard; and no one is likely to attempt manual dike construction with those working conditions.

Rice has also traditionally been "price controlled" by the local government with no real value for market. This alone would serve to keep businessmen out of rice production. Developed areas are changing this trend with more men becoming involved with rice. The main reasons observed have been to gain access to agricultural tools and materials (seed/fertilizer). Men are required to complete dike construction to qualify for agricultural credit. Once they have experienced a minimum of two crops, they then become serious about rice production because they are able to harvest--for the first time--enough rice to feed their families throughout the year.

In early 1987, the government declared a "free market." This could put rice in the same bracket as cash crops and encourage more men farmers. The men have received project benefits and information that have not reached the women farmers because men have used the benefits and information for their cash crops.

Newly developed areas in 1987 may not all benefit from extension service because the level of agents is still at a low point with the growing pains of expansion. Extension training has improved the service but not enough agents are available to cover all developed areas. In spite of this problem, villagers will still benefit the first year with

only contour dikes to retain water from rainfall. It is expected that once villagers experience water control on their own, that extension service will be able to introduce improved practices at a faster rate. It has also been observed that second and third year areas are rebuilding their dikes manually with no assistance.

## V. Problems

The main problems during the course of this project have been:

- (1) Resources needed, mainly fuel: The local government was responsible to provide work-related fuel needs but was unable to do so on a regular basis. Much time was lost because of fuel shortage and much less area developed properly.
- (2) Support to TAs: The local government was also charged with providing basic support to TAs, such as water and electricity, but was also unable to do so at an acceptable level.
- (3) Management: Management was reserved by USAID/Bissau. Very few field trips were made by management and the few that were made were much too short to get a clear picture of the many problems faced on a day-to-day basis. In this case, USAID/Bissau allowed all resources purchased, with project funds, to be managed by the local government as it saw fit. In several cases, TAs had no access to needed resources because DEPA had other needs unconnected with this project.

## VI. Recommendations

- A. Resources: It is recommended that all future resources for this and other future projects have severe restrictions placed upon them with strict but fair controls. It should be evident that the local government cannot provide necessary fuel needs to continue development and that this needs to be provided or guaranteed by USAID. That is the only way project goals can be achieved at a normal rate.
- B. Contractor (TA) Support: During the course of this project, USAID/Bissau failed to provide support to contractors even at a minimum U.S. Contract standard. The Team was given the impression that they were "only" contractors, and thus, did not have normal human needs. Again, the local government was charged with responsibility to provide support, but could not do so, and USAID was very reluctant to do so. Because of this, team members had to spend considerable personal funds to guarantee enough electricity to preserve food

supplies--at the least. It is, therefore, recommended that USAID insure that contractors in Guinea-Bissau be provided with the same support that all contracted Americans are required to receive. Contractors could then spend more time on project goals instead of self-support.

- C. Management: It is also recommended that USAID seriously consider allowing project management to be in the field. It should be clear that past management policy has been very ineffective. Field management can deal with day-to-day problems as they arise instead of waiting one to three months to do so from Bissau. If USAID cannot provide experienced field managers, then they should be contracted and properly supported. Project goals would then be achieved at a more acceptable rate.

## VII. 1988-1989 Development

The present survey/development team consists of ten people plus the chief surveyor and water manager. This team has one surveyor, one rod man, and four stake men with two tractor operators, and two helpers. Two more survey teams with six people each, have also received training during the course of the project. During 1984, 1985, 1986 and 1987 development, only one team was active in the field at one time. DEPA was unable to provide needed support (field) for more than one team. The other team members were rotated so as to provide on-the-job training for all survey personnel. All three teams can now survey new areas with only spot-check supervision. Each team can survey 1.5 to 2.5 hectares per day, depending on the terrain. During the course of the 1987 rainy season, all survey team members should check all areas surveyed and work closely with extension agents. Survey work can be verified with water control during the rainy season, as some new areas may need further development to improve water control. This should begin in July on through October. November and December should be spent assisting extension with harvest control and work plans for 1988. A list of interested villages requesting assistance should be made and new areas verified to be feasible for development. Development should begin in January through June. Time to survey will be 5 to 6 months or 24 weeks. With only one survey team working in the field, 10 hectares per week can be expected or 240 hectare total. Food support provided in the past for the 10-man team has been 30 kg rice and 30 cans (425 gm) sardines on a weekly basis (five-day week). Camping equipment is badly needed to support this team to "live-in" at each site developed. Several requests have been made in the past to USAID with no results. With reliable transportation and necessary fuel and food supply, development should continue without major problems. Thus, a yearly work plan for survey/development should be as follows:

January - June:

Survey of contours and canals as needed with tractors plowing survey lines and providing loose soil for villagers to complete construction.

July - October:

Water control with extension and verify survey of new areas.

November - December:

Harvest controls and work plans for 1988. Field days with new villagers from new areas to be developed to see areas already well developed.

Additional training should also be seriously considered. The DEPA counterpart in water management is Joseph Coly. He is fluent in French and should receive training in France. The chief surveyor is Armando Sambu. He is fluent in Portuguese and should receive additional training in Portugal with the three other surveyors being rotated, also in Portugal for at least one year at a time. Some on-the-job training would also be very important. Training out of country for less than one year is not very productive. Extension training will also be very important for future development. Future extension training should be combined with research, and research combined with extension. A research/extension department should be designed to provide more on the farm research with natural farming conditions and extension training with the existing research department for at least one crop season. Extension agents would then be better qualified to show farmers improved practices and select better seed.

If USAID is to continue development of rice lands in Guinea-Bissau, it is recommended that another type of tractor be provided. The present tractors were recommended because FAO at Contuboel already had the MF 290 and parts were interchangeable. If USAID plans on supporting its own project, a larger tractor of 100-150 HP would best serve project needs. With larger tractor a "levee plow" could be used to improve efficiency. The present MF 290 (75 HP) is too small for the levee plow. If the 100-150 HP tractors are available in Senegal, then that would be the ideal country to buy from to resolve the parts problem. Parts and fuel should be supported by USAID. Two tractors and two levee plows should be provided for each team in the field.

- A. Soil Analysis: Several soil samples have been taken during the course of this project with no results from USAID or DEPA. This should be a priority for the future development of this or other rice projects. Although expensive, soil analyses can be easily obtained in Senegal.

- B. Bridge Construction: Small bridges have been constructed in 14 villages to improve access to farming areas. These bridges were built using wooden boxes for culverts as a short term solution. Concrete with reinforced steel should be provided to rebuild these structures once they collapse. At least two metric tons of cement should be provided to begin construction with reinforced steel. Additional stocks should be calculated as new areas are developed.

**APPENDIX II**

**Final Technical Report**  
**on**  
**Extension and Agronomy**

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**July, 1987**

## INTRODUCTION

As stated in the Project Evaluation Report of November 1984, the duties of the Extension Specialist/ Agronomist could be summarized as follows:

1. Assess current capabilities and train the extension staff through specially designed in-service courses and field training (lay-out of trials, data collection, etc.)
2. Suggest higher level of training for promising extension staff.
3. Develop a system to evaluate the work performance of DEPA agents.
4. Suggest improvements in recruitment procedure and criteria for new DEPA agents, including sensitivity to include women.
5. Design simple on-farm trials in improved basfonds to compare relative effectiveness of improved rice management.
6. Organize farmer training programs and field days.
7. Work with Project Coordinator and extension agents (also referred to as Field Extension Workers) to describe farming systems, village decision-making, inducement to project participation, and re-orientation of project as necessary to assist farmers.
8. Work with rice specialist and topographer in identifying and developing basfonds.
9. Identify needs for short-term expertise in specific problem areas, should they arise.
10. Coordinate project activities with other agricultural activities.
11. Assist in secondary crop activities, as feasible, such as gardening, upland crops, and appropriate technology.

It is obvious that the above duties constituted a formidable and rather an ambitious task to be achieved in two years. Nevertheless, efforts were made to attend to each of the items; and in spite of the extremely difficult conditions at the site, commendable success was achieved. In the following pages, an attempt has been made to summarize the accomplishments under each of the duty categories.

## ACHIEVEMENTS

### Background:

After the arrival of the Extension Specialist/Agronomist on the site in May, 1985, considerable time was spent in taking stock of the existing situation. The extension staff consisted of 10 poorly trained extension agents and two so-called coordinators (who actually performed the duties of supervisor) for the zones of Contuboel and Sonaco. The educational level of the agents was extremely low, ranging from two to five years of high school. However, some of the agents did have a few in-service short courses offered by DEPA that gave them a limited idea of their role and know-how as extension workers. One positive aspect of their background was that almost all of them came from rural areas and consequently they were well adapted to village conditions.

In contrast, most of the Asian countries have field extension staff with university degrees and urban background not compatible with the rural conditions. The rural adaptability of the local extension staff could, therefore, be used in making up the deficiency in their education through appropriately designed field and classroom training. The local counterpart of the Extension Specialist/Agronomist (at that time known as the Coordinator of Contuboel Zone) also had four years of high school, but about ten years of work experience in dealing with the villagers. His common sense and practical knowledge proved invaluable, and could be used to advantage in extension work.

The extension agents were functioning mainly as intermediaries between DEPA and the farmers for the distribution of inputs such as fertilizer, seed, fuel, and other agricultural implements. They were also entrusted with the recovery of input costs from the farmers. Their main function as extension agents, that of disseminating improved agrotechnology was, at best, treated as a secondary task. This often led to misuse of the money recovered from the farmers, favoritism, and ensuing distrust among the farmers about the credibility of the extension workers. In fact, a series of farmer meetings held in September, 1985 indicated that the majority of farmers in the area had a poor idea of the role of an extension agent. They believed that the extension agent was mainly an intermediary to provide inputs and his foremost task, as an advisor on improved technology, was the least known among the villagers. Against the above background, it was found imperative to educate the villagers about the principal role of the extension staff and also enhance their credibility. Because of the troubled past of the project, it was important to make a rapid impact on the farming community and on DEPA. It was decided that the work should begin in the field rather than at the center.

Assess current capabilities and train the extension staff through specially designed in-service courses and practical field work:

Personal interviews and the initiation of an extension agent-managed rice plot, was considered the best way to assess the current capability, commence field training, and plan for a suitable classroom training program for the extension staff. The other advantages of an extension agent-plot were the following:

1. Enhance the credibility of the agents amongst the farmers by showing that they could practice what they preach.
2. Give the agents an opportunity to practice different methods of rice culture.
3. As per an agreement worked out with the villagers, the total proceeds of this plot went to the extension agent. This provided him with a supplemental source of income.
4. The plots could simultaneously be used as the sites for on-farm research.
5. A well-managed plot served as a demonstration field.

A typical extension agent plot was designed to test three levels of fertilizer (including a control with 0 fertilizer), and direct seeded rice (in lines and broadcast) versus transplanted rice (at random and in lines). Please refer to Figure 1 for illustration. Depending on the water availability and nature of soil, some basfonds could be transplanted as well as direct seeded but in others, either transplanting or direct seeding alone could be practiced. Inputs such as fertilizer and seed were supplied on credit, payable after rice harvest. The extension agents were given detailed instructions on installing this plot and also encouraged to keep a record of their operations and labor inputs. With this data, they could be taught to interpret their results in economic terms. Such plots served as an excellent tool for the field training of the staff and also as a live illustration for the benefit of the farmers. In 1985, when such plots were introduced for the first time, only a few agents could show satisfactory work. Their performance depended on various factors such as field experience, technical competence, logistics, and the level of cooperation from the villagers.

Besides giving a clue about the ability and sincerity of the agents, the variation in implementation (including the mistakes made) of these plots, was, at times, a blessing in disguise for instructional purposes. For instance, in 1985 one of the extension agents planted the individual plots in his parcel at different dates instead of completing the work on the same day (as per the guideline). Nevertheless, his parcel was an

excellent illustration of the positive relationship between late planting of rice and increased Gall Midge (silver-shoot).

During the layout and subsequent management of the extension agents' plots, they were instructed on the practical aspects of the following:

1. Land preparation for direct-seeded and transplanted rice.
2. Calculation and application of fertilizer doses.
3. Direct seeding and transplanting in lines.
4. Maintenance of a uniform seed rate and plant population in different plots.
5. Timing and procedures for weed control (including rotary weeder).
6. Top dressing with urea.
7. Judging the severity and subsequent control of different pests and diseases.
8. Harvesting and estimating yields.

During the first year (1985 rainy season) extension agent managed plots were initiated in 12 project villages; out of which, those in 8 villages had satisfactory to excellent illustrative utility. In the subsequent rain-fed season of 1986, it was decided that all the villages (and, hence, the full extension staff) under the jurisdiction of DEPA assistance, should be included under the project for the overall revamping of the extension service. Accordingly, in 1986, all 22 villages adopted by DEPA were programmed for establishment of extension agent plots. In 15 of these villages, the agents could boast of successfully completed plots. Considering that 1985 was the first year of initiation of such an activity, the success rate is quite encouraging. It shows that the local staff has the will to work and learn, if guided properly.

Informal training and in-service courses: In the beginning of the redirected phase of this project (1985 rainy season), provision of agricultural inputs and tools on credit was the surest way of making a quick positive impression on the farming community. Initially, the distribution of agricultural inputs on credit had to be handled by the field extension staff until the project could allocate and train separate staff for the service of credit alone. Thus, some time was spent in the beginning to teach the extension agents individually about the objectives of an agricultural credit program and simple record keeping pertaining to the same. Eventually it was planned to relieve the extension agents totally from the duties of a credit program and

ensuing money matters. This would allow them to devote full time to the primary job of being technical adviser to the farmers.

Quite some time was initially spent in preparing a few training texts for the extension staff. However, this material later proved to be too sophisticated for the purpose, mainly because it was completed prior to adequately examining the educational standard of the staff. It was, therefore, conceived that individual field training should continue for some more time before venturing into formal in-service courses. In September 1985, an order was placed for various audio-visual aids and simple agricultural texts prepared by FAO. This would reduce the time required to prepare such materials locally. However, the order was never realized. Subsequently, another list of training aids, stationery, pH/salinity meters, visual material for village work, etc., was prepared and submitted to USAID/Bissau in December, 1985 for Procurement. The list was further updated and specified as per the catalogues supplied by USAID/Bissau. Unfortunately, this order is still pending. It was later decided to prepare the required training materials locally and use the existing audio-visual equipment (supplied by FAO) for instruction. In November, 1985, the Extension Specialist/Agronomist participated in preparing a general outline of courses (including the course syllabi) for the overall training activity of DEPA for the year 1986 (declared as the year of training by the Ministry). This outline of courses encompassed other food crops (corn, sorghum, millet, peanuts) besides rice which is the major focus of this project. A course on rice production of about four weeks' duration was planned to be offered in a staggered manner. Eventually, due to the preoccupation of field work, only two courses (each of one week duration) were implemented; the first on "Rain-Fed Water Management in Basfonds" was held in January, 1986 and another on "Rice Production" was offered in March, 1986. The water management course mainly dealt with contour dikes and was almost entirely based on practical field work. The rice production course, about 70 percent theory and 30 percent practice, dealt with the crucial aspects of rice cultivation from sowing to harvest. It was designed to prepare the field staff for the 1986 rain-fed rice season. A full-scale course, titled "Extension Methods/Rice Production", was designed and implemented in the off-season period of February, 1987. Visual aids such as slides, transparencies, posters, and small models for this course were prepared locally. Most importantly, a series of lectures on relevant topics were written in English and translated into Portuguese to serve as handouts after each teaching session in the classroom. These handouts are used as reference text for the extension staff. The topics covered are listed below:

(I) Extension

1. Agricultural Extension -- An Introduction.
2. Basic Concepts of Human Behavior.

3. Extension Models.
4. The Adoption and Diffusion of Innovations.
5. Women and Agricultural Extension.
6. Farmer Interviews.
7. Extension Personnel and their Roles.
8. Action Zones for Extension Supervisors, Field Extension Worker Circles, and Groups of Farmers.
9. Contact Farmers.
10. Farm Visits.
11. Some Specific Issues of Importance in Extension Work.
12. Reorganization, Essential Features, and Staffing Pattern of DEPA Extension Service (see Annex I attached to this report).

(II) Rice Production

1. The Characteristics of the Rice Plant.
2. Types of Rice Cultures with Reference to West Africa.
3. Rice Seed Selection and Testing.
4. Rice Nursery Preparation.
5. Land Preparation and Water Management for Planting Rice.
6. Transplanting and Direct Seeding.
7. A Bird's-eye View of Post-plant Crop Husbandry, Fertilization and Plant Protection.
8. Azolla -- Basic Notion.
9. Precaution in Mixing Fertilizers.
10. Frequently Used Calculations in Rice Production.
11. Moisture Content of Paddy.
12. Application of Pesticides and Calibration of Sprayers.

In addition to the listed topics included in the text, several other subjects such as major pests and diseases of rice, description of varieties grown in the region, concepts of animal traction, the role of agricultural credit, contour survey and

installation of dikes, photoperiodism, introduction on soils, shifting cultivation, compost and green manure, photosynthesis, post-harvest care of rice, and basics about experimentation were briefly covered during the course. These topics were supported by notes dictated during the lectures.

Field training on new farmer contact methodology: The extension agents were given individual practical training on the following:

1. Maintenance of a daily field activity agenda.
2. Formation of farmer groups and the selection of contact farmers.
3. Scheduling of visits to the groups of farmers in accordance with the local practice of religious activities and holidays.
4. Making notes on crop situation and problems voiced by the farmers.
5. Conducting farmer meetings in the villages.

Suggest higher level training for promising extension workers:

Considering the poor educational background of the extension staff, it would have been premature to suggest higher level training during the short project period. There was a lot to be gained through the in-service courses listed above. However, it should be pointed out that four members of the extension staff did participate in short-term foreign training, without the prior notification or consent of the Extension Specialist-Agronomist. Surprisingly, two members attended courses that had no relevance whatsoever to their duties. Higher level training has been proposed for the DEPA field extension coordinator (counterpart) to be scheduled to occur at the end of the contracted technical assistance in July, 1987.

Develop system to evaluate the work performance of DEPA agents (Reorganization of the extension service):

The performance of any extension program, and hence an extension worker, can at best be evaluated in terms of the overall improvements in the level of agricultural production and income of the farming community. Such an assessment is difficult in a project span of two seasons. It is difficult to isolate the impact of extension alone from other factors influencing crop yields. Under this condition the best indicators of agent performance should be the following:

1. The opinion of the farmers.
2. The technical know-how of the extension worker and his ability to manage his plot.

3. The sincerity and regularity with which the worker establishes contact with his farmers.

Reorganization of the existing extension network and the introduction of an efficient farmer contact methodology, achieved under this project, were the prerequisites towards a built-in capacity for a continuous ability to track performance. The details about the reorganization of the DEPA extension wing are presented in Annex I.

Suggest improvements in recruitment procedure for new DEPA agents:

One of the important achievements in the field of extension was the recruitment of the new extension agents and elimination of the incompetent ones. The goal set forth in the statement on revised project outputs was to field a total of forty trained extension staff. A study conducted by the Extension Specialist/Agronomist indicated that it would be realistic to ultimately establish an extension network of one field extension coordinator, four supervisors, and 32 field extension workers in a phased manner. Accordingly, at the present there are 24 adequately trained field extension workers (including 13 agents recruited in the course of the project), supervised by three extension supervisors, and headed by the field extension coordinator. It should be noted that two promising recruits quit their jobs because of the meager pay scale.

New recruitment procedure: The procedure consists of five selection criteria listed below.

1. Knowledge of Fula and/or Mandinga language.
2. A minimum of five years of local Lyceum school education.
3. Written test: Due to questionable school teaching standards it was important to verify the candidate's knowledge with a diagnostic test. The test was designed to prove the agricultural background, general knowledge, and basic understanding of arithmetic and botany needed to follow a simple and practical training program in rice agronomy and extension (please refer to Annex II for a sample test).
4. Interview: There were certain qualities such as sincerity, interest, ability to communicate, etc., that could be judged only through a face-to-face conversation with the candidate. All the prospective recruits were interviewed. Their combined performance in the written test and interview was used for scoring purposes.
5. Compatibility with the village life: The candidates screened successfully through the above procedure were

provisionally selected for a village adaptation survey. They were posted in different villages in the company of their old colleagues, and supplied with the required food ration. After a four-week observation period, only those that show interest in their work and were compatible with the village life were recruited against the existing vacancies.

This procedure has served very well in the two major recruitment sessions conducted during the project and can be expected to do so in the future.

Inclusion of women extension agents: Traditionally, rice is cultivated by women; as such, it was logical to try to recruit women extension agents. This possibility was looked into and found impractical due to the following reasons:

1. Difficulty in obtaining women candidates with the required educational qualifications.
2. General reluctance of women to serve as extension agents in the domain of rice culture. This may sound paradoxical, but it should be recognized that eligible women candidates are normally those who have chosen to stay away from villages in general and rice cultivation in particular.
3. The DEPA extension agents serving rain-fed rice farmers (basfonds) also worked in irrigated rice zones during the dry period. Here they have the additional work of supervising water distribution and pump operation. Obviously, this made an already tough job more difficult for women.
4. DEPA does have a few women extensionists working in the field of vegetable gardening on a very limited scale. However, DEPA was reluctant to recruit women for rice extension due to their negative past experience.

It should be mentioned that the extension wing did try to reach out for women rice cultivators through alternate methods:

1. Inclusion of prominent and elderly women cultivators as contact farmers. Such farmers do help to bridge the communication gap between the male extension agents and women cultivators.
2. Encouraging the participation of women in larger numbers at the village extension meets.
3. Seeking the help of women vegetable gardening extensionists to assist the village extension workers whenever needed.

### Design on-farm trials:

Under the existing pattern of rain-fed rice cultivation, it was important to compare the relative effectiveness of simple agronomic improvements to be recommended under the project. Due to the limited time frame of the project, it was decided to focus on the following:

1. Advantages and impact of improved seed, limited fertilizer dosage, effective top dressing with urea, line planting, water/soil conservation through contour dikes, and use of rotary weeder.
2. Probe and demonstrate the effective harvest of residual moisture available in some basfonds after rice harvest.
3. Compare the water conservation efficacy of a traditional rice cultivation method known as "Balunculo," practiced by the local Mandinga community.

The extension agent-managed plots described earlier also served as on-farm trials for improved seed, fertilizer doses, line planting vs. random planting, dike vs. no dikes, and rotary weeder vs. hand weeding. Significant results obtained and demonstrated to the farmers as a result of these trials were the following:

1. Direct seeding or transplanting in lines is more advantageous than random planting mainly because of the added efficiency in weeding and fertilizer application.
2. Dikes do conserve moisture and make a considerable difference in yields compared to undiked fields. The positive impact of dikes is more evident in the event of long and intermittent rainless periods during critical stages of the rice crop cycle.
3. In many cases, dikes are responsible for maintaining a layer of water in the paddy fields and thereby lowering the weed incidence.
4. Moderate fertilizer application and/or manuring is essential for good yields. Half the dose recommended by DEPA (150 kg/Ha urea and 150 kg/Ha of 12:24:12) appeared to give results similar to those obtained under the full dose.
5. Reduced plant population gives better tillering, less disease incidence and, hence, higher yields compared to the thick planting commonly practiced by the local farmers.

Some of the basfonds in the project area (e.g. Tantacosse, Cutame, and Madina Sare) have plenty of residual moisture after the harvest of rain-fed rice. The soils retain considerable

moisture from November to March due to the shallow water table and fine texture. This can be used to advantage by an early maturing and drought tolerant leguminous crop, which in turn contributes to the Nitrogen economy of soil, serves as a supplemental protein source, or provides feed for the animals. The first experimental plot for a residual moisture-based leguminous crop was selected in Tantacosse. The village comite' (chief) who owned the plot readily volunteered for the trial. Cowpea (locally know as Feijao Mancanha) was chosen as the trial crop. The treatments included tilled and untilled plots, with and without rice straw mulch, using line planting as well as dribbling in holes. The problem of stray cattle was eliminated by a traditional bamboo fence erected around the trial.

Being the first trial conducted with the help of farmers, it ran into various management problems. Despite the odds, the trial ended with a note of success. The best plot yielded about 800 kg/Ha of dry grains. The second trial was conducted in the following year (January, 1987) at the same site. This time, due to the added enthusiasm of the farmers, the area under cowpea was doubled. The treatments included plowed and unplowed main plots, under-fertilized and unfertilized conditions. In tilled plots, the seeds were sown in lines and broadcast. However, in untilled plots, there was an additional plot where seeds were sown in individual holes punched in lines with a wooden bar fixed with equally-spaced metal teeth. The objective was to select a land preparation and planting technique that could conserve and use moisture adequately. The results are depicted in Table 1. The yields obtained under different treatments indicate that land tillage (plowing once with a country plow) is essential for reasonable yields. Apparently, tillage does not lead to detrimental moisture loss and does promote good root development and weed control. The highest yields were obtained in tilled plots that were continuously seeded or dribbled in lines with fertilizer (800 and 750 kg/Ha, respectively). Farmers who do not have the means to apply fertilizer can still hope to get decent cowpea yields just by plowing once and sowing in lines (550 kg/Ha). Thus, a sequential leguminous crop after rice harvest is feasible in some basfonds and the possibility should be explored on a greater scale. Farmers in Tantacosse are impressed with the results and the same could hopefully be expected from other villages.

#### "Balunculo", a traditional rice practice:

This is practiced and found highly suited in upper reaches of basfonds having coarse-textured soils. The technique consists of digging a series of closely-spaced pot holes with a simple spade. The diameter of these irregular ditches ranges from 50 to 100 cm., and their function is to hold water. The rice seed is sown on the ridges formed around the ditches. The advantages of this method are the following:

1. Conserves water efficiently.

2. Clears the weeds and prepares the seed bed in a single operation.
3. Normally, no weeding is required throughout the crop cycle. This is achieved by the exposure of subsoil as well as the presence of a water layer in the holes. Also, the high seed rate used on the ridges suppresses the weed growth.
4. In the process of digging the holes, the weeds are simultaneously incorporated beneath the ridges and serve as a green manure.

A trial was conducted in the rainy season of 1986 to compare this method of cultivation with that of conserving water by dikes spaced as per a 10 cm. drop in contours. Preliminary results indicated that in the coarse textured and highly drained soils around the upper reaches of basfonds, the Balunculo technique may be worth continuing. In this case, yield improvements should be attempted through improved seed, manuring, and plant protection (if economically feasible). In specific cases, two factors that overwhelmingly favor the Balunculo practice are the following:

1. Efficient water conservation.
2. Significantly lower weed incidence; and, hence, greater saving in labor inputs.

#### Organize farmer training programs and field days:

Organization of farmer training programs is a very big task in itself, and cannot be justifiably achieved in a short period loaded with other activities. The main task at hand was to set up a training program for extension agents, and through them, hope to enlighten the farmers. However, to lay the ground work for a future program and to arouse the enthusiasm of the farmers, two one-day center-based farmer training sessions were held in 1986. The procedure adopted was to invite a few interested farmers from each of the project villages and offer them an audio-visual instruction session of about two hours. This included a slide show on project activities in the villages, so as to avoid boredom and keep their interest alive. Simple posters illustrating the use of improved seed, manuring practices, contour dikes, and line planting were prepared for the purpose. Meals were provided during the sessions.

One important contribution in extension was the initiation of a program of field study visits or field days. Well-maintained extension agent plots served as the demonstration fields for the purpose. The procedure adopted was as follows:

1. Selection of a basfond site for the proposed field day. This was based on the quality of the extension agent plot and other good rice fields belonging to the

farmers. Village interest and cooperation were also considered.

2. Preparation of the day's program with a time-table (please refer to Annex III). This specified the time of arrival of the participants, introduction of activities, plots to be visited and points to be discussed. A definite time was set apart for a question-answer session with the participation of farmers and extension agents.
3. Selection of two participating farmers (preferably a man and a woman) from each village. The selection was based on the interest, communication ability, hard-working nature, and the willingness to share ideas shown by villagers.
4. Provision of transportation to and from the site and luncheon for all the participants.
5. Technicians from the DEPA research wing, USAID staff and senior DEPA staff were also invited to such occasions.

Field days were programmed mostly toward the harvest period, when the crop would display its yield potential. In the two seasons of project activity, six field days were conducted all highly successfully. Besides fulfilling the main function of disseminating improved cultivation practices, the field days also achieved other ends:

1. Served as a commendation and an incentive to the village and the respective extension agent whose plots were the focus of attention during the day.
2. Helped to foster a better relationship between the farmers and the project.
3. Acted as a forum for DEPA and USAID/Bissau to keep in touch with the project activities.
4. Gave an opportunity to exchange ideas and seek the advice of the farming community in serving them in a better way.

#### Extension meetings in villages:

One of the major activities of the Extension Specialist/Agronomist was to participate in the frequently held village farmer meetings attended by his counterpart and the respective extension agent. The objective of such meetings was primarily to seek farmer adoption of water control dikes and other agronomic improvements promoted by the project. The meetings also gave an opportunity for feedback and information exchange on a broader scale in comparison with the field days. The motivation of those

farmers that were most unwilling to change traditional practices could best be achieved in such meetings, generally attended by farmers of varied categories. Some new procedures were introduced to streamline the conduct of such meetings so that the most could be achieved in a short time. The farmers were always encouraged to offer criticism of the project work and suggest ideas to improve the same.

Work with the project coordinator and extension agents to describe farming system, village decision making, inducements to project participation, and re-orientation of project as necessary to assist farmers:

The extension wing did plan in the beginning to work with the project coordinator; but in practice, this was not possible given the other duties of the coordinator. Certain activities were nevertheless carried out in the sphere of local farming system, village decision making, inducements to project participation, and re-orientation of activities.

Local farming systems: Part of the training imparted to the extension staff included a notion of the influence of a farm family's total farming system on decision making concerning rice cultivation. In 1985, the extension agents were also entrusted with the task of collecting limited yield data on other important crops such as corn, sorghum, millet, and peanuts. The objective was to get a general yield picture of different crops, and also to broaden the one-sided view of an extension wing in rice production. Another notable activity was the documentation of all crops in the region with color slide pictures. The slides were used for instructional and informational purposes.

Village decision making: Field visits and village meetings were the best media to study the decision making in the villages. In September, 1985 a series of special meetings were held in all project villages to judge the impact of the first rainy season of the project work. Some major findings of this effort were the following:

1. The local division of labor dictates that rice is a woman's crop, but all the major decisions influencing the same are mainly made by the men.
2. Upland subsistence crops such as corn, sorghum, millet, and fonio, and cash crops like peanuts are cultivated by men. Consequently, during the months of April, May, June, and July, men are busy with clearing the woods (cut and burn), tillage, and planting operations. In the same period, men are also involved in the important task of repairing houses and constructing new roofs to prepare for the rains. Implementing the project objective of improving water retention by contour dikes requires that men participate in this job during the same months. Obviously, this proved to be very difficult with the heavy work load already imposed on

men during this period. The field extension wing, therefore, attempted to motivate the farmers (men) to help the women in dike construction during the slack period immediately following the harvest of rice. At this time of the year, there is sufficient moisture in the basfond soils to facilitate the work.

3. With the exception of a few villages (Madina Sare, Dembalure, and Velingara) the participation of women in village meets was weak. This was bound to result in a communication gap for technology transfer. Frequent pleas were made especially with the elders to improve the participation of women. This did improve their participation to some extent.
4. The already overworked women (with household tasks) find it rather difficult to give adequate attention to post-plant care of the rice crop. The emphasis is on risk reduction, by planting as much area as possible instead of taking good care of a limited area planted in time. Women were also keen to have more than one rice plot due to economic reasons. The main plot, as a rule, is owned by the family as a whole and the production is controlled by men. The other plot (or plots), generally situated in the basfond periphery, is for the exclusive use of women.
5. The ratio of cultivable area to the farming population influences decision making. This ratio is considerably high in Africa, in comparison to Asia. The project area is not an exception to this rule.

Inducement of farmer participation in achieving project objectives: Any sustainable development effort is attainable only through the cooperation of farmers and their active participation. In this project, farmer participation was encouraged through demonstration, persuasion, and the incentive of supplying agricultural inputs and tools on credit. The level of farmer participation in building dikes was judged through a procedure in Annex IV. The adoption of other agronomic improvements was judged through field visits and final rice yield estimates (please refer to Annex V for the procedure used to estimate yields). The supply of materials on credit was made only to those farmers who showed a promising degree of participation.

Work with rice specialist and topographer in identifying and developing basfonds:

With the redirection of the project in December, 1984, the main criteria for identifying basfonds for development were mainly (1) the interest shown by the villagers, (2) the feasibility of erecting simple water control structures, and (3) priority for the areas already under cultivation.

The number of village perimeters and the area to be adopted for development should be limited by the ability of the technical assistance team to provide equal and sufficient attention to all. The development effort should be focused in a small area so that successful and sustainable examples would be left behind. The 1984 evaluation had endorsed this view and eliminated the verifiable indicator of the number of hectares developed. The project can definitely boast of a considerable amount of success in demonstrating the positive impact of contour dikes. However things could have been better, but for the points listed below:

1. Lack of proper understanding between the field extension wing and the basfond development team. One of the factors responsible for this situation was the difference in priorities placed by DEPA and the project evaluation document on the number of hectares developed. The Director of DEPA in Contuboei still emphasized the expansion of area under development.
2. Consequently, the basfond development team (entrusted with the task of contour survey followed by the staking out or tracing of the contours with a disk plow) ended up covering a large area in many villages. This was done without consideration of either the willingness or the ability of the farmers to participate in completing the dikes manually. As a result, at the conclusion of the 1986 rainy season out of the total 263 Ha covered by the development team, only 90 Ha were satisfactorily completed by the farmers. The strategy from then onwards should have been to bridge the gap between the area surveyed and that completed by the farmers. But despite the appeals made by the extension wing, the survey work in 1987 was further expanded to cover more areas and villages. It should be recognized that surveying and tracing of contours is a mechanical task that is independent of the social and economic setting. The extent of technology adoption by farmers should be measured by the number of hectares completed by farmers and not by the number of hectares surveyed.
3. The willingness of the village to pay for the tractor fuel required to trace the contours was interpreted by DEPA as an indicator of their readiness to adopt the technology of dikes. The extension wing, however, believed that almost all of the new villages willing to pay for the fuel were doing so with the hope of securing agricultural inputs and tools on credit.
4. The drainage canals laid out in some of the basfonds in the technical judgment of the project agronomist appeared to be unnecessary and superfluous during the 1985 and 1986 campaigns. The important task under the present rainfall conditions in the project region is probably to hold rain water and not to drain it.

5. Because of the rapidity with which the survey work was conducted in new villages, farmers (especially women) were not sure of what was happening in their basfonds.

The Extension Specialist/Agronomist prepared a report, which was submitted in October, 1986, pointing out his concerns. This document is attached as Annex VI.

Identify the need for short term expertise:

The project did not benefit from any previous data on the nature and fertility of the local soils. Practically no prior data was available. Nothing could be done to remedy the situation because of the absence of an adequate soil analysis facility in Guinea-Bissau. Some samples that were sent for analysis were never acknowledged. In September, 1985, the Extension Specialist/Agronomist had recommended to summon short-term expertise to do a preliminary study on the local soils. Such a study could have helped to make better recommendations on manuring and fertilization. However, AID/Bissau did not opt for the same.

Coordinate project activities with other agricultural activities:

A major attempt was made in this direction by trying to establish proper liaison between the research and extension wings of DEPA. An improved organizational chart was prepared for the research and extension departments and other services in DEPA, Contuboel. The chart is presented in Annex VII. A program for regularly scheduled meetings between research and extension personnel was also drawn up (please refer to Annex VIII). A general meeting was called and was attended by research and extension personnel and the local Director in December, 1986. The above-mentioned proposals were presented in this meeting, and they were well received. The full implementation of such proposals is a bureaucratic process that cannot be predicted. Increased participation of the DEPA agronomist and another research technician in field days and farm visits is an encouraging sign that should be attributed to the efforts cited above.

Informal training of the DEPA agronomist and research technicians: The DEPA agronomist was periodically trained, at his request, in design, statistical analysis, and graphic presentation of agronomic experimentation. He was also assisted in preparation of his annual technical report. The DEPA rice experimentation fields were often visited to aid in solving and/or interpreting field problems.

Assistance in secondary crop activities:

Two important contributions that were made in this directions are:

1. Successful trials of a sequential cowpea crop after rice harvest. This is already detailed in a previous section.
2. Technical advice was provided, when requested, on manuring and irrigation of the dry season vegetable gardens promoted by DEPA in a few of the project villages.

#### PROBLEMS IN IMPLEMENTATION

1. Transportation: The proper functioning of any field extension department depends on the mobility of its field staff and supervisors. When the new technical assistance team arrived on the field in 1985, there were three old Land Rovers at their disposal. Except for a few old bicycles in operation, the local extension staff, including the counterpart, had no transportation. The project requested three new vehicles for the team, motorbicycles for extension supervisors, and new bicycles for extension agents. However, the vehicles did not arrive in time. The three Land Cruisers for the team were received at the end of the 1986 crop season, but the motorbicycles and bicycles were received only towards the end of the project. Consequently, the heavy work load of the two crop seasons had to be accomplished with a single old Land Rover allotted to the Extension Specialist/Agronomist.
2. Poor road conditions: Most of the "roads" providing access to the project villages are expanded foot or donkey-cart tracks, and hence, are in very bad shape. No road maintenance is done. In the rainy season, when most of the field work is done, these roads pose a formidable challenge even for the Land Rovers.
3. Low education level: The meager school education of the extension staff was a major hurdle in implementing a training program. The challenge was to make the subject matter very simple yet comprehensive, and this took quite a while.
4. Frequent fuel crisis: During the rephased project life of 31 months, there were frequent minor and at least two major fuel shortages. This often stopped the field work, led to poor electricity supply, and lack of drinking water at the Center.
5. Local division of labor: Rice is a "women's crop," yet mostly men took part in extension communications and agricultural transactions. Despite the efforts made to overcome this situation, a void was always left in dissemination activity.

6. Management of Contuboel Center: The lack of management expertise, administrative capability, and record keeping resulted in logistical problems for the project. Key DEPA personnel at the Center frequently left for seminars or training programs abroad, causing further problems in some of the decision making related to the project.
7. Poor pay scale for the extension staff: Field extension is an important, tough, but thankless, job. For their hard and sincere work, it is important that the extension staff receive adequate compensation. With the poor pay scales currently being offered, it would be impossible to maintain an effective extension department. As a result of a proposal made by the Extension Specialist/Agronomist, the salary was augmented to a limited extent with the help of project funds. However, it is necessary that the Ministry upgrade and sustain higher pay scales to build an efficient extension program.
8. Non-receipt of the material ordered: Toward the end of 1985, the extension wing prepared a long list of much-needed stationery, audio-visual aids, training literature, rain apparel, etc., to support the extension wing. This was ordered through AID/Bissau early in 1986. Unfortunately, this material had not been received at the end of the project.
9. Unscheduled departure of the extension staff: Local extension workers attached to the project were sometimes sent abroad without the prior knowledge of the technical assistance team. This often resulted in dislocation of the work schedule.
10. Isolated condition of the project site: Contuboel is an isolated place, and as such, presented several problems of livelihood. To seek the most rudimentary medical attention or to make a phone call, one had to travel to Bafata, a town 30 kilometers away. 15 kilometers of this route is a dirt road which gets worse in the rainy season and is linked with an unreliable wooden bridge near Contuboel. Locally, there are no postal services; hence, letters and other communications addressed to the technical assistance team were received at USAID/Bissau, and took weeks to reach from Bissau to Contuboel. Unreasonably rigid interpretation of travel and vehicle use regulations by USAID/Bissau during most of the project life, resulted in letting the technical assistance team out of Contuboel generally once a quarter.

## RECOMMENDATIONS

### 1. Phased expansion, organization and training of the extension service:

Number of staff members: This primarily depends on the long-term goals that DEPA wishes to establish for itself, which, in turn, is dependent on the funding available. If the ultimate goal is to influence all the identified village perimeters, then the expansion of field staff already planned under the project appears to be the best road for the future. This will finally lead to a total of 32 extension agents, 4 supervisors, and 1 coordinator, which is in accordance with the goal specified under the revised project outputs. However, recently there were some rumors about the Guinea-Bissau Government's plan to reduce the number of employees. In that event, it would be wise to reduce the number of villages that DEPA wishes to assist. Assuming that the current state of frequent fuel crisis, reduction in funding, etc., continues in the future, it would be unrealistic to expect that a reduced number of field staff could attend to the originally planned number of villages. Past experience suggests that one extension agent can attend adequately to a maximum of 170 farm families.

Organization and methodology: The organization and method of extension work planned and implemented during the project should be adequate for any future direction. In the unfortunate event of one extension agent having to attend, say, six villages, the already introduced farmer contact methodology should be efficient. Instead of forming six farmer contact groups, the agent can now consider each village as one of the six bi-weekly contact groups.

Training: In the long run, added emphasis should be given to the fortnightly training planned under the reorganized extension schedule (see Annex I). Such training is inexpensive and focuses on a few technical details that the agent should remember for his work in the subsequent week. Thus, he is not overburdened and confused with details. Center-based courses should be continued on a reduced scale and geared to impart knowledge applicable directly to the problems in the field.

### 2. Future direction for a renewed project:

Because of the inter-dependencies of different agricultural activities performed by a farm family, a renewed project should be based on a farming systems approach. The experience gained under this project indicated that implementation of any improvement in rice culture is determined by other activities (both agricultural and household) of a farm family. Similarly, it was felt that an extension service should be holistic in approach to better understand and appreciate the plight of farmers in accepting

innovations. Hence, the scope of an extension project should include at least the other subsistence crops such as corn, sorghum, and millet. Possibilities of raising drought-resistant rice-based leguminous crops should be explored further to use the residual moisture, contribute to soil fertility, and improve human nutrition.

### 3. Agronomic improvements for rice production

The recently introduced free-market system and other monetary changes have produced an encouraging economic environment for promoting rice production in Guinea-Bissau. Rice can now be openly sold in the markets and fetches a reasonable price. As such, the project is terminating when, in fact, it should have continued with added vigor. The present approach of minimum intervention with simple water retention dikes, improved varieties, planting in lines, limited fertilizer application, etc., should be continued if the project resumes. However, particular attention should be paid to the points listed below.

- (i) Use of other promising improved varieties besides BG 90-2 and I Kong Pao that have been used for a long period and are susceptible to blast disease and soil acidity.
- (ii) Aluminum toxicity and iron toxicity appear to be the major soil problems in the area. In a situation where lining is not economically feasible, the best approach is to look for resistant varieties and adequate organic manuring.
- (iii) An integrated pest management strategy should be adopted with emphasis on cultural methods of pest control. A recent IRRI publication giving pictorial explanation of the above approach is an excellent source of information. (Project recently translated this publication into Portuguese.)
- (iv) The meager and unreliable chemical plant protection assistance, provided at no cost by DEPA, is not sustainable because of its complete dependence on foreign help.
- (v) Efforts to improve rain-fed water management in basfonds should be continued, but on a manageable scale. The emphasis should be on contour dikes that retain water. Drainage structures should be introduced, if necessary only after a careful study of their need and feasibility in a contour diked field.
- (vi) Application of chemical fertilizer should be advocated on a limited basis and supplemented by organic manuring. Presently in the region, the use of organic manure in the rice fields is extremely rare. However,

the local villages have easy access to a large quantity of green matter and animal waste, which could be utilized for compost-making. What is needed is an extension effort in this direction. Peanut (a major crop in the area) shells and peanut cake, obtained after the extraction of oil, are also good sources of manure.

- (vii) Greater effort should be made to promote animal traction in rice cultivation. This will relieve the overburdened women and save their valuable time and energy for maintenance of dikes, post-plant crop care, and other productive uses.
- (ix) Some basfond soils (Sarebiro, Cutame, Madina Sare, Tantacosse, etc.) carry considerable reserves of residual moistures into the dry season. This moisture could be used for cultivation of grain legumes and vegetables wherever feasible.
- (x) Some traditional practices such as Balunculo rice cultivation and the use of certain plants as pest repellants are efficient, and therefore, should be carefully evaluated before recommending any modification.

#### 4. Credit Program

A credit program, if feasible through donor assistance, should be continued with particular attention to the following:

- (i) The field extension staff should not be involved in monetary transactions and supply activities, but it should be entrusted to decide on the eligibility of the farmers for credit.
- (ii) The credit materials should be realistically priced so as to avoid their sale for profit-making.

An itemized summary of the past status, present condition, and direction for the future is presented in Annex IX.

**ANNEX I**

**Reorganization of DEPA Extension Division**

12N:24P:12K (150 Kg/Ha)  
Urea (150 Kg/Ha)

No Fertilizer

12N:24P:12K (75 Kg/Ha)  
Urea (75 Kg/Ha)

Direct Seeding (lines)	Direct seeding (lines)	Direct seeding (lines)
Direct Seeding (broadcast)	Direct Seeding (broadcast)	Direct Seeding (broadcast)
Transplanting (lines)	Transplant (lines)	Transplanting (lines)
Transplanting (random)	Transplant (random)	Transplanting (random)

Figure 1 Typical design for an extension agent-managed rice plot

Table 1  
Yield data of residual moisture-based Cowpea trial

Land Preparation	Planting Method	Fertilizer (N:P:K Kg/ha.)	Yield (Kg Dry grains/ha.)
Tilled Once	Sowing in lines 40 cm apart	20 : 40 : 20	800
Tilled Once	Sowing in lines 40 cm apart	0 : 0 : 0	550
Tilled Once	Dribbling in lines 40 cm X 15 cm	20 : 40 : 20	750
Tilled Once	Broadcast Sowing	20 : 40 : 20	450
No Tillage	Sowing in lines traced with a small hoe 40 cm apart	20 : 40 : 20	270
No Tillage	Sowing in lines traced as above 40 cm apart	0 : 0 : 0	200
No Tillage	Sowing in holes 40 cm X 15 cm	0 : 0 : 0	70

## ORGANIZATION OF AN EXTENSION SERVICE

The role of agricultural extension in sustained and productive agriculture needs no elaboration. However, what is important is the realization that agricultural extension service should be effective and supported by agricultural research that is appropriate to the needs of the farmers. Too often extension service is portrayed as an activity of questionable benefit because of the difficulty in isolating the contribution of extension to agricultural development. Recent experience in many developing countries has shown that an extension service founded on a strictly professional basis can have a rapid positive affect in augmenting agricultural output.

The key to a good extension service is to have well-trained and effective field extension workers (FEW) who will be in frequent and regular touch with the cultivators to disseminate appropriate technological innovations and who will also serve as a link to supply field problems to research. The extension service must be directed by field oriented, dynamic, and innovative personnel. Farmers and their fields should be the focus of the service and all concerned staff must receive continuous and regular training relevant to the realities in the field and the research must be oriented to the priorities of the farmers.

The financial outlay of the system should be minimum and in tune with the expected benefits. For practicability and adjustment to the limited resources of the farmers, the initial effort should be on the improvement of low-cost basic agricultural practices. Such improvements include good seed, better land preparation, limited fertilizer use, intercultivation, and weeding. Extension work should be supported by availability of good seed, fertilizers, agricultural chemicals, market system, and an effective credit service. However, in a young and underdeveloped country like Guinea-Bissau, the emphasis should be on dissemination of appropriate technologies that result in better yields through more efficient use of whatever resources and services that are already available. Such initial improvements will automatically lead to more demand and pressure for availability of additional inputs and services. For example, initial breakthrough in rice production in this region of the country, can be achieved through improvements in better soil/ water management, good seed, seed treatment, better cultivation methods, etc. Such improvements are not capital intensive and are easy to implement just through farmer education.

The kind of extension service envisioned is dependent on the availability of resources, trained technical manpower, and the educational background of field extension workers. The extension organization described here is an appropriate system, based on a methodology devised and introduced successfully in some developing countries by the World Bank. The system involves

continuous training and systematic field visits and is highly compatible with the meager resource conditions of the region and low educational level of the personnel involved in field work.

### ESSENTIAL FEATURES OF THE EXTENSION SYSTEM

An effective extension service should have certain features that are elaborated as follows.

#### Professional competence:

Good advice to the farmers can only come from people with adequate technical competence. Extension workers must be in touch with the latest in their field to come up with adequate recommendations. This is possible only if each extension agent is continuously trained to handle his duties as a professional.

#### Unambiguous control:

The extension service should be controlled administratively and technically by a single line of authority such as one autonomous unit in an organization (e.g., Department of Agriculture, Research Center, etc.). However, the service should be supported by other units such as teaching, research, credit, and other governmental or private input and supply agencies.

#### Emphasis on agricultural extension:

The extension personnel, especially the FEWs (Field Extension Workers) should work exclusively on agricultural extension. They should not be entrusted with other duties such as supply of credit inputs, distribution of subsidies, collection of money, processing of loans, etc. Non-extension activities disturb the professionalism, work schedule, and credibility of the extension service among the farmers.

The FEW should work only on agriculture and mostly on those crops and husbandry appropriate to a particular region, season, and locality. This is accomplished through a finite number of contact farmers who are responsible, skilled, respected, and representative of their lot. Each hierarchical position in the extension service should be responsible for specific duties that compliment and support the task of the FEW. It is generally believed that the optimum number of immediately lower staff that one can control is about 6 to 8. A village extension worker should also be made accountable for a limited number of farmers' groups and actually deal with a number of limited representative farmers within these.

Training should focus on major important issues, and likewise, research should concentrate on key constraints that are facing the farmers.

### Regularly scheduled work:

The farmers must be taught skills in a regular and timely manner to make the best use of means at their disposal. The FEW should visit each of his farmer groups regularly on a fixed day, at least once a fortnight. The supervisory staff also must make timely and regular visits to the fields to carry out the responsibilities. The supporting teaching and technical staff should present recommendations for a particular time and farming conditions for each fortnight to the FEWs and supervisors. The training sessions should precede the relevant work in the farmers' fields.

### Regular field work:

The farmers should be regularly contacted on a predetermined day. Large number of farmers representing major farming systems and socio-economic types should be included. For convenience, the farmers in the agent's jurisdiction are divided into 6 to 8 groups; and each group is visited at least once a fortnight, as pointed out earlier. Other members of the extension service should also have regularly scheduled field visits. The extension agents and supervisors should not be burdened with additional paper work beyond completing a work plan and a daily diary.

### Continuous scheduled training:

There should be regular fortnightly training sessions for the extension agents and a monthly workshop for the training staff. These are to teach and discuss appropriate production recommendations required by the farmers for the coming fortnight and also to refresh and update skills of the extension workers. Training and workshops also have the additional benefit of assisting in the exchange of information among staff and farmers.

### Bridging the gap between research and extension:

Survival of extension service depends on the technical information that originates from that research. The awareness of research personnel about the problems of the farmers depends on the feedback from the extension network. Such feedback is achieved through the training sessions, field visits, workshops, etc.

## EXTENSION STAFF AND THEIR ROLE

Staffing pattern for any organizational setup should be appropriate to the present modus operandi and compatible with the projected resource availability. The proposal here is based on a critical assessment of the following:

1. The existing staffing pattern.

2. Current resource availability (includes funds and infrastructure) and a realistic projection of the same for the future.
3. Educational background of the available personnel.
4. The overall agricultural area that DEPA wishes to influence.

The hierarchical positions in the envisioned extension service are described in ascending order as follows.

Field Extension Worker (FEW):

The FEW is the basic and vital link between the farmers and any agricultural development undertaking. He is the only worker who is directly responsible for the difficult task of transmitting to the farmers suitable agrotechnology and motivating them to use it. Extension is not just telling farmers about improved agricultural practices but also is explaining the practice in terms of the particular circumstances of the individual farmer and persuading them to try at least an adaptation of the practice. Besides his own initiative and effort, the success of a FEW depends on a number of basic supports for the effective implementation of his task. The FEW requires close and regular in-field guidance from his supervisors both to help him influence the farmers under his jurisdiction and to encourage him in his work. The FEW should also receive training from the technical staff in training sessions.

The FEW has a fixed number of farm families for whom he is responsible. This number is variable, but in some Asian countries could range from 800 to 1000 families. Under present conditions, each DEPA FEW serves between 50 and 100 families. This number could easily go up to 300 with training, efficient planning, and adequate transportation. Hence, in effect, the DEPA sphere of influence could be expanded considerably in time without increasing the number of field workers.

The number of farm families within the jurisdiction of each FEW is divided into 6 discrete approximately equal-sized groups. In each group, about 5 to 8 representative and active farmers should be selected as contact farmers. The recommendations explained to the contact farmers and some other farmers of a group could be transmitted quickly to all other interested farmers. Under the local conditions the group size can range from 10 to 30 families for the present and reach up to 50 families in the future. The main task of the FEW is to visit regularly (at least once in a two-week period) each of the 6 groups of farm families entrusted to him to teach and try to convince farmers to adopt recommended production practices. The visits/meetings should normally take place in the field, where the FEW can actually see crop conditions and gain first-hand knowledge of the difficulties and problems encountered by the farmers. While focusing primarily on contact farmers, the FEW

should encourage other farmers to join the discussions and visit their fields as time permits. In rice fields (basfonds) it is convenient to form individual groups of families having adjacent rice parcels, starting upstream of the basfond. The FEW should have a small rice field (parcel) of his own, acquired through an agreement with the village committee. This has been done successfully for the past two seasons. The "FEW-parcel" serves four important purposes: (1) imparts practical training in crop husbandry, (2) enhances the credibility of the extension agent in the eyes of the farmers, (3) serves as a demonstration/trial site, and (4) serves as a source of income, and hence, incentive, for the FEW.

In addition to his other tasks, the FEW should devote some time to conducting demonstrations in farmer's fields and holding field days when necessary.

For the present status of agriculture in the concerned area (especially rice farming), the emphasis should be on making the best use of the resources already at the farmer's disposal. The recommendations should be introduced in stages. Initially, the effort should focus only on better land preparation, improved nursery and seed bed, seed selection, and treatment, timely weeding, appropriate spacing, water control, and so on. Such practices require more work but little cash outlay and are almost certain to produce good results. Thus, the farmers face little risk in their acceptance. The results of costly investments such as optimum fertilizer application, irrigation, etc., can give the maximum benefit only when improvements such as the above are undertaken.

#### Agriculture Extension Supervisor (AES):

The supervisor has the basic responsibility of organizing and assisting the work of the FEW. The next main area of supervisory work is to provide technical support to the FEW. In his basic task, the AES has to help the FEW in forming farmers' groups, choosing contact farmers, scheduling meetings/field days, and to supervise FEW's attendance of training sessions and interaction with the farmers. Technically, the AES should also see that production recommendations are properly disseminated and adjusted to conform to the situation of individual farmers to facilitate the process of adoption. The field problems encountered by the FEW should pass through the AES to the appropriate specialists and outreach personnel. At his level, the AES should also conduct some farm trials in farmers' fields in collaboration with the FEW.

To achieve his objectives, the AES must be primarily a field worker, spending at least 8 days each fortnight in the field, visiting each of the 8 FEWs under him. This will ensure that the FEW is visiting his farmers regularly. The AES will also spend two days of the fortnight in training activities, one conducted

informally by him to his FEWs and other conducted by specialists for the benefit of all FEWs. The AES should keep a diary for recording the findings of field visits.

#### Field Extension Coordinator (FEC):

The FEC supervises the AESs and FEWs and as such is in overall charge of field extension work. The FEC, through field visits and training sessions, should take necessary measures to insure that the extension service is effective. He should also coordinate information on the supply and demand of agricultural inputs and market conditions in the locality. The fortnightly training sessions should be organized logistically and attended by the FEC. While formulating recommendations, the coordinator should see that these are applicable under local conditions. The FEC should maintain a constant link with the staff at his level (Training Coordinator, Extension Support Officer, and Credit Services Officer), and with the Agricultural Specialist (attached to the research wing) through the Liaison Person, so as to convey regular information on extension aspects. This should help with organizing training sessions through the Training Center. He should also advise the credit service about the agricultural equipment and other input requirements of the villages and the eligibility of individual farm families for credit facilities. Coordination of input supplies (on credit) for "FEW-parcels," general field study days, leave requests of FEWs and AESs, etc., should also be the responsibility of the FECs office. The AES, for the special campaign for vegetable gardens, will also report directly to the FEC.

#### Training Coordinator (TC):

The TC is responsible for the overall planning of both informal and formal training sessions that are conducted in the DEPA Center. The sessions also include workshops, seminars, and fortnightly training activities for the FEWs and AESs. The planning work involves the arrangement of stationery, classroom/ seminar room allocations, budgeting for field study tours (within and outside the country) and training sessions, convening hostel/ canteen facilities for the trainees, etc. With the help of the Director, Extension Coordinator (EC) and Research Coordinator (RC), the TC should select monitors/lecturers for the concerned training sessions and prepare memoranda and time-tables for their classes (practical and theoretical teaching). The library and audio-visual services will also be under the jurisdiction of the TC for facilitating their use for training purposes.

#### Support Services Officer (SSO):

In the agricultural perimeter under the purview of DEPA, the emphasis is on rice production. Soil-water management and plant protection are the two areas that are receiving concentrated DEPA support in addition to the improvement of other agronomic factors (seed, fertilizer, cultivation practices) in both irrigated and rain-fed rice fields. In rain-fed basfonds the focus is on contour survey and subsequent farmer participation in the

construction of dikes, to improve water management in the face of diminishing precipitation levels; similarly, in the irrigated fields the existing dikes and canals have to be maintained in operational condition. This task is supported by a team consisting of a water management technician, a topography technician, and skilled survey workers. Plant protection is a service provided free of cost (at present) by DEPA, on a very limited basis, and is supported by a plant protection technician and a small team of skilled workers. The task of the support services officer is to coordinate this work in consultation with the FEC. In addition, the SSO will supervise the team of skilled irrigation pump maintenance workers, operating during the dry season irrigated rice cultivation.

#### Credit Services Officer (CSO):

Agricultural credit facilities such as supply of agricultural equipment (small tools, seeders, plows, bullock and donkey carts, etc.) and inputs (fertilizer, seed, etc.) on credit are provided to deserving farmers. The job of the CSO is to administer the supply and recovery pertaining to credit services in the villages. He does this with the active support of the EC, FEC and FEWs but is solely responsible for the money transactions. He has to maintain all the records indicating the supply of materials and recovery/dues of the villages. The eligibility of the farmers for credit is based on two primary criteria: (1) past dues and (2) participation in adoption of (appropriate) improved agrotechnology. The FEC is expected to provide the information on the criterion in consultation with the AES and concerned FEWs. The CSO will arrange the necessary transportation for supply of materials through the liaison officer. In his task, the CSO will have the help of a subordinate staff consisting of store officers (in charge of material storage) and credit monitors at the village level.

#### Liaison Person

As a worker parallel to the extension coordinator, it is important to have a person basically serving as a link between research, extension, and sometimes the credit service at the DEPA Center. This person will maintain a close link between research work at the Center and needs of the extension personnel, which will increase the relevance of research work to the actual needs of the farmers. This person will be directly involved in conducting research in the farmers' fields as well as guiding the extension agents to plan and execute demonstration plots, both technically and logistically. He will also help the extension coordinator in assessing the fertilizer, gasoil, and equipment needs of different villages. He will be actively involved in field work with the objective of providing technical help to the extension agents and assessing the agronomic problems of the farmers as a feedback to research. In addition to experimental trials of rice, he will also conduct trials of other food crops such as corn, sorghum, millet, and vegetables in the farmers' fields.

In order to better coordinate the numerous activities taking place at the Center, the Liaison Person will also act as programmer for the various vehicles and heavy equipment that are needed by different departments. He will maintain weekly schedules for the machinery and conduct weekly programming sessions where a representative from each department may sign up for vehicle time and coordinate with other departments for the use of machines.

#### Extension Coordinator (EC)

EC is immediately under the Director at parity with his counterpart, the Research Coordinator (RC). The EC is in the overall charge of the general extension wing consisting of Training, Support Services, Field Extension, Credit Services and Liaison activities. He is responsible for the technical as well as administrative leadership of the above-cited branches. The yearly as well as long-term planning (technical, administrative, and budgetary) of extension setup is the major task of EC's office. The EC is involved routinely in technical training and guidance of his subordinate staff, including the scheduling of regular staff meetings for coordination purposes. He maintains a close link with his research counterpart and the Director to formulate the general research and extension priorities of the DEPA Center. Also, the EC visits the farmers' fields on a regular basis to provide guidance and supervise the work of the field personnel.

#### Cooperating Personnel:

The staff belonging to the research wing, which includes the division of machinery (vehicles, repair shop, agricultural equipment, etc.) should cooperate with the extension wing so that there is a proper feedback between research and extension. The support provided by the research wing is three-fold:

1. Training of the extension personnel in technical aspects.
2. Research to look for improved technologies (production techniques) relevant to the farmers.
3. Participation in workshops along with the extension staff to tailor the new findings into recommendable technologies.

The Liaison Officer is expected to facilitate the interaction between the two wings.



**ANNEX II**

**Sample Recruitment Test**  
**For Extension Agents**

República de Guiné-Bissau  
Departamento de Pesquisa Agrícola  
C E N E M A C

Teste para selecção para recrutamento de Enquadradores

Leia com atenção e responda calmamente.

1. Dados Pessoais

.Nome: \_\_\_\_\_  
.Nome do pai: \_\_\_\_\_  
.Nome da mãe: \_\_\_\_\_  
.Local e data de nascimento: \_\_\_\_\_  
\_\_\_\_\_  
.Estado civil: \_\_\_\_\_ Nº \_\_\_\_\_

2. Habilitações literárias \_\_\_\_\_  
\_\_\_\_\_

.Disciplinas que estudou \_\_\_\_\_  
.Ano civil em que deixou a escola \_\_\_\_\_  
\_\_\_\_\_

3. Experiência profissional

.Já trabalhou? \_\_\_\_\_ Sim      Não  
.Onde? \_\_\_\_\_  
.Que funções desempenhou? \_\_\_\_\_  
\_\_\_\_\_  
.Porque saiu? \_\_\_\_\_  
\_\_\_\_\_

82

4. Saúde

.Sofre periodicamente de alguma doença? \_\_\_ Sim \_\_\_ Não

.Está vacinado contra doenças contagiosas? \_\_\_ Sim \_\_\_ Não

.Está vacinado contra o tétano? \_\_\_ Sim \_\_\_ Não

5. Línguas Nacionais/Estrangeiras que:

<u>Língua</u>	<u>Fala</u>	<u>Escreve</u>	<u>Lê</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

6. .Sabe o que é o trabalho do DEPA? \_\_\_\_\_

\_\_\_\_\_

7. O que pensa que seja o trabalho do Enquadrador do DEPA? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. Qual é a importância do trabalho de vulgarização do Desenvolvimento agrícola no País?

(Descrever em 5 linhas)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9. Já alguma vez trabalhou num campo agrícola?

- .Quando? \_\_\_\_\_
- .Onde? \_\_\_\_\_
- .O quê? \_\_\_\_\_

Qual é a cultura agrícola que mais gosta de lavrar? Por quê?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. .Dê exemplos de:

- .Culturas de época de chuva
- .Culturas de época seca

12. .Indique uma vantagem e um prejuízo de viver na cidade e na Tabanca:

a) Na cidade

- . Vantagem \_\_\_\_\_
- . Prejuízo \_\_\_\_\_

b) Na Tabanca

- . Vantagem \_\_\_\_\_
- . Prejuízo \_\_\_\_\_

13. Admite esta situação:

.O Mamadu Baldé tem um filho chamado Braima Baldé que tem 7 anos e está na escola.

.Hoje o Braima não quer ir à escola.

.Como o pai Mamadu vai fazer para que o filho vá à escola?

1. Ameaça e obriga: \_\_\_\_\_
2. Explica a importância da escola: \_\_\_\_\_
3. Manda para a bolanha de castigo: \_\_\_\_\_
4. Tira da escola: \_\_\_\_\_
5. Dá um prémio para ele voltar para a escola: \_\_\_\_\_

14. Diga:

.Em que continente se situa o seu País? \_\_\_\_\_

.Capital da Guiné-Bissau? \_\_\_\_\_

.Qual é o ministério que trata dos assuntos da agricultura:  
\_\_\_\_\_

.Quais são as culturas agrícolas mais importantes na Guiné-Bissau?  
\_\_\_\_\_  
\_\_\_\_\_

15. Qual é o programa da rádio que mais lhe agrada? Por quê?  
\_\_\_\_\_

16. Agrupa no quadro abaixo as seguintes culturas agrícolas:

Milho cavalo, milho bacil, arroz, mancarra, algodão, feijão, tomate, cajueiro, mandioca, ananás, limoeiro, mangueiro e batata doce.

Produto de baixo da terra	Leguminosa	Tubércules	Árvores	Proteinosas	Cultura alagada
_____					
_____					
_____					
_____					
_____					
_____					
_____					

17. Coloque no quadro 1 a letra correspondente do quadro 2.

QUADRO 1

QUADRO 2

Uréia \_\_\_\_\_

Carreta de burro \_\_\_\_\_

Charrua \_\_\_\_\_

Massey Ferguson \_\_\_\_\_

Sulfato de Amónio \_\_\_\_\_

D.D.T. \_\_\_\_\_

a) Adubo inorgânico

b) Alfaia agrícola

c) Tractor

d) Tracção animal

e) Adubo orgânico

f) Azoto

g) Insecticida

18. Qual é a razão porque se aplica adubo ou estrume? \_\_\_\_\_

19. a) A duração do ciclo dema planta de arroz é cerca de:

. 120 dias \_\_\_\_\_

. 300 dias \_\_\_\_\_

. 1 ano \_\_\_\_\_

b) Uma planta recebe a sua alimentação mineral através do:

. Solo \_\_\_\_\_

. Solo e ar \_\_\_\_\_

. Solo e água \_\_\_\_\_

. Solo/adubos/água \_\_\_\_\_

c) Coloque o nome certo nos espaços deixados?

(Frutos, colmo, raiz, flor)

.A parte da planta que fina no solo é \_\_\_\_\_ e a parte qua  
fica no ar é \_\_\_\_\_, que consiste de folhas, \_\_\_\_\_  
e \_\_\_\_\_.

- d) Coloque a palavra certa no espaço deixado:  
(Chuva, época seca, colheita)

.Um bom camponês lava o seu campo logo depois de \_\_\_\_\_,  
no começo da \_\_\_\_\_ assim ele poderá semear logo que  
comece a \_\_\_\_\_.

- e) Conhece alguma variedade de arroz? Qual?
20. a) Um quilómetro tem \_\_\_\_\_ metros.  
b) Um hectare tem \_\_\_\_\_ metros quadrados.  
c) O comprimento aproximado desta sala de aulas é de \_\_\_\_\_  
metros, a largura é de \_\_\_\_\_ metros e a superfície é de  
\_\_\_\_\_ metros quadrados.  
(Faça a operação)
- d) O volume dum cubo, cujo lado é de 3 metros é de \_\_\_\_\_ metros  
cúbicos.
- e) A superfície de uma circunferência com um diâmetro de 4 metros pe  
de \_\_\_\_\_ metros quadrados.
- f) A fórmula para calcular a superfície dum triângulo é \_\_\_\_\_  
\_\_\_\_\_.
- g) A superfície dum rectângulo, que tem um comprimento de 5 metros e  
de largura 2 metros é igual a \_\_\_\_\_ metros quadrados.
- h) Um ângulo recto tem \_\_\_\_\_ graus.
- i) Um triângulo de ângulo recto tem uma base de 4 metros e 3 metros  
de altura, qual é o comprimento da hipotenusa?  
(Faça a operação)

21. Uma sala de aula tem 50 alunos, 20% são raparigas, qual é o número de rapazes?  
(Faça a operação)

22. Para um bom rendimento do arroz, o camponês tem que aplicar 150 kg de uréia por hectare. Qual é a quantidade de uréia a aplicar numa parcela de 500 metros quadrados?

23. Uma moto-bomba precisa de 4 litros de gasóleo para 1 hora de funcionamento, trabalhando 8 horas por dia. Qual é a quantidade de gasóleo que é necessária para um período de 10 dias?  
(Faça a operação)

24. Resolva as seguintes operações:

$$573421 - 395342$$

$$430,4 + 2,4 + 2534,20$$

$$52,5 \times 2,62 =$$

$$392,2 - 0,52 =$$

$$370 \times 0,5 + 628 + 7000 =$$

$$893251 : 25 =$$

$$(a + b)^2 =$$

$$(a - b)^2 =$$

$$5^2 - 2^2 =$$

$$1232,2 : 3,6 =$$

## ANNEX IV

### System for Assessment of Farmer Participation on Bolanha Development

Assessment of farmer participation in the development of water control structures involves two parameters: (1) statistics, and (2) willingness of the farmer to assimilate the innovation.

#### STATISTICS

Towards the end of the rainy season, the members of the survey team (topographic section) participate in gathering statistics about the completion of the water control structures. Maps are prepared of each basfond indicating individual farmer parcels identified with the owner's name. These maps are reduced to scale. The surveyors measure the actual length of the completed water control structures and classify them in three categories: (1) very well done, (2) well done (satisfactory), and (3) poor.

Based on the above, we can roughly estimate the area benefiting from good water control and the names and number of farmers that participated in completing the structures. The three categories also give indication of the effort that was shown by the farmers. Every effort is made to extend the credit facility only to those that did good work as per the survey.

#### WILLINGNESS

The statistical data gathered above is not necessarily an indicator of the farmers being convinced of the new technology. It could also be a manifestation of their desire to avail themselves of the credit facility. The results shown for monetary gain may not be sustainable. Hence, an effort is made by the extension wing to assess the actual opinion of the farmers concerning the development of water control structures. This is done through individual or group village interviews/discussions. It is hoped that such discussions result in judging farmers' willingness to participate in the development effort.

## ANNEX V

### System for Assessment of Rice Production in Project Bolanha

#### I. FARMERS' FIELDS

Yield assessment is done through a minimum of five 25 square meter spots selected at random in each of the basfonds. Selection of yield survey spots takes into account the following situations:

1. Variety.
2. Planting date.
3. Extent of damage due to localized problems of
  - (a) deliberate neglect of parcel,
  - (b) severe pest attack (including monkey, wild boar and bird damage).
4. Depth of standing water.

#### II. DEMONSTRATION FIELDS

Properly managed demonstration fields give an indication of the yield gap that exists between potential production (through improved methods) and present production (farmers' present practices).

A typical demonstration parcel has plots with different fertilizer treatments (high, low, and nil) and planting methods (line transplanting, line direct sowing and broadcast direct sowing). The yield estimation is done on a whole plot basis with due consideration to border effects.

In both farmers' fields and demonstration fields, an estimation of yield components is also carried out. This is done by selecting randomly five hills in each of the yield sample plots to estimate the average number of tillers and panicles per hill.

#### III. FARMER INTERVIEWS

Given the lack of past statistical information on rice yields in the project area, the above data should be supplemented by comparative impressions of the farming community about the past and the present. Meetings are held during the harvest period in each of the project villages to survey the opinion of the farming community about the production of rice. Last year, such interviews provided

good evidence of yield improvements in project perimeters (e.g., Madina Sare, Ginane, Tantacosse, and Dembel Ure).

NOTE: The yield figures are adjusted to 14% moisture content of the grains. The moisture in the paddy sample is estimated by an electronic moisture meter.

#### IV. DIFFICULTIES

Yield data from traditional rice should be interpreted with caution due to the following:

1. Different varieties with varying degree of impurities.
2. Planting operations spanning from June to October.
3. Different planting methods varying from broadcasting to line transplanting.
4. Standing water depths varying from 0 to 100 cms.
5. General management level spanning from good through normal to complete neglect due to labor crises.

**ANNEX VI**

**Assessment of Basfonds Development**

## Improvement of Rain-Fed Water Management in Basfonds--An Assessment

### Background

Successful adoption of a new technique depends on several factors. First and foremost, the farmers should be convinced that the new practice contributes significantly to an increase in production. Secondly, the practice should be compatible with their social and economic realities. Thirdly, the farm family should have sufficient labor for the "extra" effort and some incentive to act as a "starter". Under the conditions of the project area, the goal of improving rain-fed water management faces all the major hurdles.

Last year, against all odds, the project did have some success in clear demonstrations of the advantage of contour dikes, especially in Madina Sare, Ginane, and Tantacosse. For sustained and large-scale adoption of water control techniques, still better and full proof demonstrations are essential. This can be achieved by concentrating the development effort (for water management structures) in a smaller area. Emphasis on attaining a large developed hectarage is bound to dilute the effort of the technical assistance team. It should be noted that effective demonstration of rain-fed water management also depends on the vagaries of rainfall. Retention of water in rice parcels is dependent not only on the quality of dikes and the type of soil but also on the amount and distribution of rainfall. Further, even under the good fortune of attaining a perfect water management, the final rice yield in a given year may be poor due to other uncontrolled factors such as diseases, pests, and problem soils. (Hence, with adequate water control structures, it may take more than two years to have a demonstration with good illustrative effectiveness.)

The project perimeter mainly consists of two ethnic communities: The Fulas (mainly pastoral and business people) and the Mandingas. The majority of villages belong to the Fulas. The Mandingas, being mainly agricultural in orientation, have evolved an effective rice cultivation practice known as "Balunculo". They prepare the land; making a series of pot holes to conserve the water (mainly on the higher reliefs of the basfond) and seed the rice directly on the bunds around the pot holes. Both the communities consider rice cultivation to be a woman's job. Men are mainly preoccupied with the clearing of new land ("cut and burn") and subsequent planting and management of upland crops such as corn, sorghum, millet, and peanuts. This type of division of labor and the fact that the village extension meetings are mostly attended by men, make it difficult to get the message across to women, the actual rice cultivators. Building of dikes and canals is a tough job and its success depends on the uphill task of luring men to the rice fields, contrary to the prevailing social custom. The project has achieved limited success in this direction through repeated persuasion and the incentive of the credit facility.

Further diffusion of a proven innovation also depends on the existence of an incentive to increase production. It can be argued that the farmers in the project area have no incentive to produce more because of the low government fixed price for rice and/or the inability to buy the bare necessities with the local currency. However, this may not be true considering the need for a higher production to cover even their subsistence demand for rice. Similarly, they can easily get a higher street price for their surplus rice or barter it across the border for essential goods without much difficulty.

Unlike most other rice producing areas, in this part of the country, rice land (basfonds) is plentiful compared to the farming population. Also, as a risk-reducing strategy, the farming women here have a tendency to continue planting more area (parcels often distant from each other) than what they can possibly manage. Consequently, in many project villages the farmers have additional rice parcels beyond the DEPA assistance perimeter. It is a common sight to see women transplanting overgrown seedlings until the first week of October, close to the end of the rainy season. Asked about the rationale for this late planting, the answer always is that they had more area to plant beforehand. Preference seems to be for planting more area instead of taking care of the fields planted in time. Given this background and the fact that the women are already over loaded with other household duties, an acute labor crisis is common at the peak of the rainy season. This is a further stumbling block for the work of water control structures. To overcome this labor crisis, the extension wing tried with little success to persuade the men to complete the dikes soon after their rice harvest (a lean period) in 1985. This year, with the reorganized extension service, a better effort is possible in this direction.

In any agricultural development effort, an immediate incentive such as a credit program is essential to accelerate the long process of adoption. The participation of men in dike construction during the last year can mostly be attributed to the supply of agricultural equipment on credit, in addition to continuous persuasion. Their response would have been better if our promises were supported with the actual supply of materials to at least a few deserving farmers. However, it should be pointed out that construction and maintenance of good quality dikes is possible only if the credit incentive is supported by a simultaneous drive of convincing the men of the absolute necessity for soil and water conservation for rice production. The importance of the above statement is indicated by the inadequate dikes constructed (1985 and 1986 campaign) by some farmers just to qualify for the credit.

The design of water management structures for rain-fed rice is much more complicated than that for an irrigated field. Both tasks warrant a thorough knowledge of the types of soils, their structures, texture, permeability, relief, water retention characteristics, etc.; but the latter has one great advantage in

that the water supply is controlled. For a rain-fed field, this is a big unknown. Thus, the water control system envisioned for rain-fed rice can, at best, be a good approximation of what is necessary. Further refinement is possible only through careful observation of its functioning throughout the season and the opinion of the targeted farming community. The farmers normally have a very good observational acumen through continuous field experience. Their opinions are always based on practical considerations and, as such, are extremely important to aid theoretical aspects. Unfortunately, they do not express their views frankly and normally tend to convey only those things that they know will please the listener. Therefore, a cultivator who outwardly voices his "extreme" satisfaction with dikes, may not privately mean what he says. During the last and current campaigns, the extension wing has made several successful attempts to encourage the farmers to provide their critical observations of project work. Some of their concerns are the following:

1. Water control structures take away a lot of cultivable area.
2. The drainage canal takes the water away from their parcels/basfonds.
3. The contour dikes sometimes divide the parcels belonging to the same family into two or more parts.
4. Alternately, in the same contour, two or more farmers have their parcels. This causes conflict in water management when these farmers plant at different times.
5. Uncertainty about the usefulness of contour dikes. (A benefit/loss concern).

The above concerns turn out to be genuine if our strategy of the development effort as well as the level of success in preparing the farmers for proper construction and management of the structures are poor. For instance, if the dike construction is poor and/or the drainage canal does not serve its real purpose the farmers' first concern is justified. Similarly, even if drainage is essential but the canal is not properly built and/or managed their second concern turns out to be true to some extent. The third and fourth concerns are mainly organizational and can be eliminated by fostering better cooperation and understanding within the farming population of the basfond. The fifth concern is being resolved through farmer education.

#### Present Outlook and Future Strategy

The background information given above has indicated that the task of improving water control is rather a delicate one and needs a cautious approach. The initial impressions made on the farming community are crucial from the adoption point of view.

Last year, the project was aimed at the installation of the whole package of contour dikes, drainage canal, and dikes for division of individual family plots in regular shapes. The latter facilitates the task of calculating seed and fertilizer requirements. The results indicated that this was rather an ambitious target to achieve. This year the basfonds development team decided to introduce development in stages by first building the dikes for division of plots and a central drainage canal followed in subsequent years by contour dikes. The extension wing did anticipate some problems with this approach, and these turned out to be true in the field. The plain basfonds such as Ginane and Bonco may not need a drainage canal due to good internal drainage of their soils (very light in texture) and weak water flow during most of the prevailing rainy season. The excess water in the event of an occasional heavy shower can effectively be controlled by spillways built along the contour dikes. Also, in a basfond where a strong need for drainage is suspected due to abrupt relief (e.g., Tantacosse and Cutame) it should be advantageous to first encourage the adoption of contour dikes so that the farmers themselves can appreciate the probable need for drainage at the end of the rainy season.

Observations made so far on the actual working of the canals and dikes in Tantacosse, Cutame, Bonco, and Ginane support the above-mentioned view. Even the plots adequately enclosed with good construction very rarely showed the need for drainage. In places where the dikes and canals are badly constructed and/or managed (large area) the drainage canals proved to be detrimental. In many spots, the drainage canal had water but the surrounding rice plots were completely drained. The construction of dikes for division of plots instead of contour dikes also contributes to poor water retention. In Tantacosse, the water that used to spread in the contour plots from the upstream watershed (last year, in the absence of canal) was carried straight to the lower areas through the canal leaving the upstream plot without water. This would not have been the case in the absence of the canal or its closure at the right spots. Regardless of its causes, the malfunction of the water control structures strengthen farmers' concerns (cited before) and lowers the credibility of the development effort, resulting in delayed adoption.

The purpose of the observations made above is to learn from the experience gained and improve the mode of action for the future. Some suggestions in this direction are presented below.

Under the low rainfall pattern of recent years, the greatest need appears to be the storage of rainwater and not its drainage. Further, in rain-fed agriculture, the maintenance of proper depth of water is next to impossible, even under elaborately built control structures. The strategy should, therefore, be to start with the minimum possible structure building work that has the maximum probability of success. The steps for this type of approach are as follows:

1. Designating a small area for development (starting from the upper reliefs of the basfonds) in each of the participating villages.
2. The priority should be for the construction of contour dikes followed by smaller dikes to designated family plots.
3. A drainage canal may be added in subsequent years if necessary. In fact, this approach will result in better judgment of the need and location of a canal through the actual water flow pattern set by the preceding rainy seasons in the contour diked fields.
4. Continued persuasion of men is essential to relieve the overworked women of the heavy physical task of the land preparation.
5. Timely provision of agricultural equipment/inputs on credit as an incentive to encourage the participation of farmers (especially men) in contour dike construction during the slack months immediately following the rice harvest (October - November). This is also the best time to work the soils due to the presence of sufficient moisture.
6. Active village participation of the basfond watershed including the flow and retention of water within the contour levee system, is essential to make the necessary modifications redesign in the subsequent years.



**ANNEX VII**

Organizational Chart for DEPA  
Contuboel

FINANCIAL ASSIST.  
**FAO**  
TECHNICAL ASSIST.

**DIRECTOR**

FINANCIAL ASSIST.  
**USAID**  
TECHNICAL ASSIST.

**RESEARCH**

**EXTENSION**

ADMINISTRATION

RECORDS

ACCOUNTS

WORKS

MACHINERY

SOILS / FERTILITY

AGRONOMY

PLANT PROTECTION

INTERDISCIPLINARY RESEARCH

SEED PRODUCTION

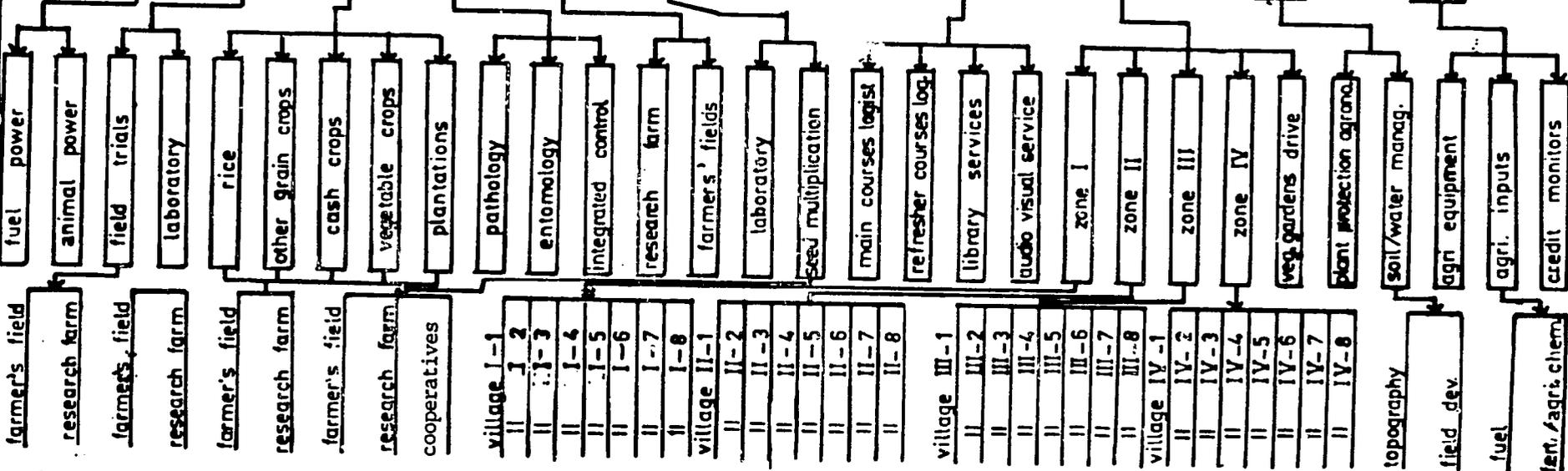
LIAISON (planning meets)

TRAINING

FIELD EXTENSION

SUPPORT SERVICES (extension)

CREDIT SERVICES



ANNEX VIII

SUGGESTED WORKSHOPS TO PLAN  
EXTENSION/RESEARCH  
ACTIVITIES

<u>WORKSHOP</u>	<u>PARTICIPANTS</u>	<u>OBJECTIVES</u>
<p><u>Pre-season</u> <u>Research/Extension</u></p>	<p>Director, heads of the research and extension wings, research scientists/technicians, extension coordinator, training coordinator, support services officer and liaison person and a farmer representative Technical assistance teams (FAO,USAID) will also attend.</p>	<p>(1) Decide on agricultural development objectives for the season in the area. (2) General strategy to attain the objectives set forth, including the recommended practices to be extended. (3) Discussion of the research results of the past year and their applicability in the field suggested research activity for the season. (4) Estimation of the input requirements, including market needs.</p>
<p><u>Monthly</u> (Bimonthly) <u>Seminar</u> (Meets monthly or once in two months as per need)</p>	<p>Research Scientists/ technicians, extension coordinator, agri-extension supervisors, support services officer, liaison person, farmer representative, Credit representatives of agricultural equipment and inputs.</p>	<p>(1) General production recommendations and discussion of relevant research and farm trials. (2) Problems of the farmers' field that were solved or to be forwarded to research</p>

<u>WORKSHOP</u>	<u>PARTICIPANTS</u>	<u>OBJECTIVES</u>
<p>Fortnightly (Monthly) Training Session</p>	<p>People involved in teaching (researchers, coordinators, etc.) and trainees such as, AES, Field extension workers, and Lady extensionists (vegetables).</p>	<p>(3) Seasonal weather and field conditions. (4) Extension activities of the previous months and farmers' response. (5) Estimation of inputs and their distribution realized so far and need for improvement.</p> <p>(1) Training extension workers on specific recommendations to be transmitted to the farmers during the coming fortnight. (2) Discussion of the experience gained during the previous fortnight, and farmers' reaction (3) Problems to be transmitted to the monthly workshop.</p>

**ANNEX IX**

**SUMMARY OF THE PAST, PRESENT AND FUTURE  
FOR THE DEPA EXTENSION DIVISION**

(1)

Extension Division

Before 1985

Now

Future

18 poorly trained extension agents.

25 adequately trained extension agents.

32 adequately trained extension agents.

2 supervisors for extension

3 supervisors for extension

4 supervisors for extension

No coordinators

1 field extension coordinator adequately trained.

1 field extension coordinator.

2 extension zones

3 extension zones

4 extension zones

No clear demarcation of responsibilities.

Clear line of control with each of the three supervisors (under the coordinator) having about eight extension agents to supervise.

Each of the four supervisors with eight extension agents to supervise.

Lack of clear extension methodology.

Clearly defined extension methodology.

-Do-

Poor contact with majority of farmers.

Well defined plan for each extension agent to contact maximum number of farmers under his jurisdiction.

Improved implementation of this plan after the receipt of means of transportation and other extension material under order.

Poor coordination between research and extension

Definite plan for interaction between research and extension with fair degree of implementation already initiated.

Further improvement of implementation.

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Extension Division

(2)

Before 1985

Now

Future

No demonstration plots in the villages.

Extension agent managed rice plots in each of the 22 villages intended to demonstrate traditional and improved practices as well as to try different manurial doses.

Extension agent managed plots in 32 villages with improved degree of workmanship.

No trials to explore the possibility of rice based sequential crop.

Two trials of common beans (legume) based on residual moisture after rice (rainfed) harvest, showing quite promising results.

Possible extension of this system to more villages.

Lack of "field days"

About five well planned "field days" in two seasons with clearly defined plan.

Expansion of the same with the participation of research division.

Lack of proper recruitment procedure for extension agents.

Well defined recruitment procedure based on a written test and an interview, to test the basic requirements for a good extension agent.

Further refinement of this procedure.

No audio-visual aids to educate farmers.

Few simple posters prepared for the purpose.

More and better audio-visual aids.

Few training sessions for ext. agents with poorly defined and executed curriculum

Two training sessions with a third full course on "extension methods and rice production techniques" with well defined curriculum. Also, a fully prepared preliminary text on the above subject, with notes on 27 topics.

Further refinement of the course, curriculum and text for possible publication (internal).

Poor salaries for the extension staff.

Proposal for a new salary structure, partly implemented.

Full implementation and further improvement in salaries.

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Extension Division

(3)

Before 1985

Now

Future

Lack of materials and transportation.

Essential materials for village extension work and transportation means on order.

Receipt of these materials and efficient allotment of the same

Poor field training of the agents.

Regular field training of the agents in farmer contacts, and production techniques with the active participation of the counterpart.

Clear schedule for such training and better implementation of the same.

Few and irregular farmer meetings in the villages, without an agenda.

Frequent village visits and regular farmer meets with a clear purpose of disseminating improved water management technique and other cultural practices such as intercultivation, etc. Follow up meets to verify the response of the farmers to the recommended practices.

-Do-

Inadequate "yield study" methodology.

Improved "yield survey" methods both for the farmers' fields and the extension agents' plots.

-Do-

Well defined procedure to verify farmer participation in building water control dikes.

Further improvement of the same.

Simple trial to compare traditional "Balunculo" rice cultivation with the new methods.

Further expansion of such trials.

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**APPENDIX III**

**Final Technical Report on**  
**the Credit Program**

Linda D. Smith  
Project Coordinator  
Guinea-Bissau Rice Production Project  
Aurora Associates, Inc.

July 1987

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## I. Background

In 1984, DEPA had requested USAID to furnish agricultural materials to farmers participating in the bolanha development program. USAID agreed to this request on the condition that the Center could guarantee controls for these commodities and equitable distribution to the beneficiaries. A credit department was, thus, created and, at the request of the DEPA Director/Bissau, the department was made responsible for all materials for resale to farmers regardless of donor.

Due to financial difficulties, DEPA was unable to support an adequate credit staff. For the first year, the department functioned with only one bookkeeper, responsible for all credit operations. By the second year, however, a second bookkeeper and two credit monitors were provided. Documents were created and record-keeping systems put into place. Stock clerks were trained to control sales stocks in two locations, Contuboel and Sonaco. Inventory cards and requisition systems were instituted.

As the DEPA program operates in many of the same villages as the Bafata project, the DEPA credit department attempted to coordinate with Bafata regarding credit terms and prices. As realities in the villages became more evident, the program necessarily evolved. In the first year, farmers were asked to pay one third down for their materials, one third was due after the first year harvest, and the final third after the second year harvest. A token interest rate of five percent was levied on credit sales. Credit payment was extremely poor, despite the fact that the farmers did not appear to really need credit at all, given low government-fixed prices and the overvalued peso.

In the second year, credit terms were adjusted. One half down payment was required with the balance payable after the harvest that same year. Hand tools and fertilizer were to be sold for cash only; traction materials were available for sale to villages with no outstanding credit. The government significantly increased prices for agricultural inputs, but farmers still preferred to pay cash as interest on credit sales was increased to fifteen percent. Farmers who were not entitled to further credit because of arrears found cash to purchase new materials rather than paying off their 1985 credit.

In the third year of operation, agricultural materials were made available only to villages without credit arrears. Some villages began repaying old credit in order to qualify for new materials. In other villages, however, complications began surfacing. Pay-back by villagers appeared to be greater than previously thought, but cash subsequently disappeared higher up the chain (village

leaders, extension agents, credit monitors). Villages qualifying for credit still prefer to pay cash to avoid the fifteen percent interest charge.

The extension wing complicated the credit system when it began distributing materials to villagers on credit during two additional agricultural campaigns (horticulture and dry-season). As villages were not entitled to more credit until pay-back had been completed, separate accounts were necessarily set up to record these sales for credit with different due dates. As villages were poor in credit repayment, the credit department was eventually overwhelmed with the additional record keeping. The DEPA Director/Contuboel finally agreed to extending credit annually, rather than on a per "campaign" basis (about every three months), and all sales were consolidated by year. Villages are obliged to satisfy all past credit before being allowed to purchase new materials, even on a cash basis.

## II. Credit Situation as of May 31, 1987

In March 1987, all sales for 1985 and 1986 were consolidated into one account, as this effectively covered five agricultural campaigns beginning with the rainy season of 1985. Billing has not quite been completed for the last two campaigns as there has been no transportation for credit monitors' field work.

The information is, therefore, incomplete, but for known sales the situation as of the end of May 1987 is as follows:

### 1985-1986

Materials received	10,648,955 PG
Advances	- <u>6,098,122</u>
Credit Extended	4,550,233
Reimbursement	- <u>2,521,531</u>
Balance (Arrears)	2,028,702 PG

### 1987

Materials received	2,916,939 PG
Advances	- <u>2,550,939</u>
Credit Extended	366,000
Reimbursement	<u>-0-</u>
Balance	366,000 PG

In addition, 29,545 PG and 112,100 PG have been advanced but the villages are not yet billed for 1986 and 1987, respectively.

### III. Implementation Problems

The problems encountered in attempting to implement a credit program at DEPA were overwhelming, far more so than is normal in Africa. Credit personnel were too few in number (lack of DEPA finances), poorly motivated (low salaries), and lacked transportation (motorcycles) for village work. Lack of separate warehouse facility for credit materials made it impossible to adequately control their disposition. Chronic management problems at DEPA made it virtually impossible to deliver inputs to the villages on time, as trucks, fuel, oil, and laborers were in short supply. Skill levels are exceptionally low at the DEPA center, and bookkeepers were called upon to function as professionals while simultaneously learning basic arithmetic. Low salaries of credit personnel (and extension agents) provided incentive to dishonesty and the chief accountant eventually spent fifty percent of his time unraveling cases of disappearing funds at the village level. In the end, a separate fund was necessarily created to furnish loans to extension personnel in the hope of discouraging unofficial "borrowing". As of June, however, the credit department was effectively shut down when the bookkeeping staff was suspended for profiteering, leaving two ineffectual credit monitors.

In addition to logistical and administrative difficulties, the credit program suffered from macro-economic problems as well. From the outset, it was clear that GOGB fixed prices on agricultural inputs, resistance to interest charges, the over-valued currency and the lack of commodities in the country prevented a credit fund from revolving. Farmers, used to free agricultural inputs provided by DEPA, were slow to adjust to demands for payment for these same materials. The lack of a coordinated regional credit service often resulted in two or three different credit programs operating in the same villages, associated with different projects in the area. These proved to be overwhelming constraints to the implementation and sustainability of a credit program in Contuboel.

### IV. Recommendations

- A. DEPA should not be attempting a rural credit program in this area as management is already over-extended in attempting to manage programs at the center itself. As DEPA is determined to continue its off-season irrigated campaign, for which definite inputs are required, it

should limit its credit program to these villages and to commodities necessary for this work.

- B. If DEPA would like to provide credit services to other villages in its zone, it should work more closely with the Bafata project which now has a mandate to coordinate extension/credit services in this region. Bafata has the infrastructure and administrative capability to more effectively serve the area farmers.
- C. Credit personnel will require much more education before they will be able to maintain sales and stock records. The present personnel are not yet ready to manage cash sales without supervision. Bookkeepers should select a candidate to be trained abroad at a technical college in bookkeeping and rural credit theory, to function as the chief accountant and supervisor.
- D. A separate facility with adequate inventory control should be constructed for storing commodities to be resold to farmers.

Consolidated Village Credit Report  
(in GB Pesos)

1985-1986 (as of May 1987)

<u>Tabancas</u>	<u>Materials</u>	<u>Dinheiro</u>	<u>Credito</u>	<u>Pago</u>	<u>Balanco</u>	<u>Avancos*</u> <u>Maofac-</u> <u>turados</u>
Bonco	1,484,826	1,365,392	119,434	16,577	102,857	
Candjal	55,887	30,180	25,707	10,530	15,177	
Canquenhí	73,709	21,880	51,829	45,205	6,624	
Cataba Alfa	254,089	195,525	58,564	58,564	-0-	
Cont. I	20,961	8,886	12,075	5,450	6,625	
II	412,629	374,292	38,337	37,838	499	27,550
Cutame	279,908	96,600	183,308	89,400	93,908	
D. Uri	792,018	294,012	498,006	314,786	183,220	
Djabicunde	402,740	295,951	106,789	69,698	37,091	
Enquadrador	11,256	-	11,256	10,582	674	
Fulamore	57,718	29,000	28,718	2,800	25,918	
Ginane	520,232	214,252	305,980	204,794	101,186	
M. Ioba	517,043	350,733	166,310	95,293	71,017	
M. Sara	748,896	348,170	400,726	219,590	141,136	
Outros	274,604	240,846	33,758	-	33,758	
Palama	254,772	142,249	92,523	47,437	45,086	
Sambac	65,106	57,630	7,476	-	7,476	
Santanto	241,426	47,013	194,413	63,641	130,772	
S. Dabel	118,873	47,148	71,725	8,000	63,725	
Sare Djaiba	439,056	137,797	301,259	193,000	108,259	
S. Biro	312,433	197,405	115,028	115,028	-0-	
Saucunda	597,117	239,741	357,376	110,730	246,646	1,995
Sin. Bacar	33,568	1,700	31,868	2,260	29,608	
Sin. Django	42,970	41,500	1,470	-0-	1,470	
Sambadjau	90,300	42,900	47,400	-0-	47,400	
S. Fanca	86,124	37,200	48,924	4,600	44,324	
S. Mansali	92,661	28,050	64,611	22,913	41,698	
Sonaco	594,640	359,139	235,501	29,880	205,621	
Sotocol	12,488	5,280	7,208	-0-	7,208	
Timbinto	129,624	119,250	10,374	9,723	651	
Tanta C. II	53,551	2,850	50,701	21,195	29,506	
Tanta C. I	505,798	119,982	385,816	332,411	53,405	
Waquilare	692,510	411,331	281,179	186,934	94,245	
Velingara	274,740	70,838	203,902	151,990	51,912	
	<u>10,277,273</u>	<u>5,974,722</u>		<u>2,520,849</u>	<u>2,028,702</u>	<u>29,545</u>

Tabancas Sem Debitos

Cansantim	450	450	-0-	-	-	
Ceba	37,582	36,900	682	682	-	
Mansandjam	15,250	15,250	-0-	-	-	
Mulafo	1,400	71,400	-0-	-	-	

Grand Total    10,648,955    6,098,722    4,550,233    2,521,531    2,028,702    29,545

\*Represents money paid by villages for materials the value of which has not yet been recorded.

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Village Credit Report - 1987

as of May, 1987

<u>Tabancas</u>	<u>Materials</u>	<u>- Dinheiro</u>	<u>= Credito</u>	<u>- Pago</u>	<u>= Balanco</u>	<u>Avancos</u> <u>Maofac-</u> <u>turados</u>
Badjingara	12,440	12,440	-	-		46,800
Lenqueto						60,000
Contuboel	646,069	646,069	-			
Outros	835,408	761,608	73,800		73,800	
Sonaco	6,890	6,890				
Palama						
Djabicunda	169,769	169,769				
Cataba Alfa	5,320	5,320				
Canquenhim	16,430	16,430				
Waquilare	250,730	250,730				
Sincthan B.	3,800	3,800				
Saucunda	227,617	227,617				
S. Biro	634,026	341,826	292,200		292,200	
S. Bacar	66,040	66,040				
Same Doia	27,560	27,560				5,300
M. Sare	9,010	9,010				
M. Ioba	5,830	5,830				
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<b>TOTAL</b>	<b>2,917,029</b>	<b>2,551,029</b>	<b>366,000</b>	<b>-0-</b>	<b>366,000</b>	<b>112,100</b>