PD-AAP-734

EVALUATION OF THE RICE PRODUCTION ACCELERATED IMPACT PROJECT GUINEA-BISSAU

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PD-AAG-183-B1

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
Accelerated Impact Program for Rice Production (AIP)*	698-0410.02	USAID/Guinea-Bissau

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) FY-79-1

☐ REGULAR EVALUATION ☒ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES	6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY 78	A. Total $ 2,500,000	From (month/yr.) Sept. 1977
B. Final Obligation Expected FY 81	B. U.S. $ 2,000,000	To (month/yr.) Dec. 1979
C. Final Input Delivery FY 82		Date of Evaluation Review January 1979

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED

*This is a special evaluation of a project originally designed as an A.I.P Project, now being considered for expansion through a Project Paper to be developed.

RECOMMENDATIONS

I. Actions to be addressed by USAID/Bissau:

A. Short-term technical assistance (PIO/T)

1. To establish a system for monitoring and evaluating the Geba River

2. To help improve the overall irrigation scheme and specific use and flow of water from the Geba River

B. Provide spare parts and maintenance support for existing materials and equipment.

C. Submit request for PP Development Team, along with IEE (attached)

II. Actions to be addressed at this time by GOGB and by Project Paper Design Team for expansion of project.

A. Over first year expansion, perfect activities on the three perimeters currently in operation (see page 26 of evaluation).

B. Provide a system for definitive cost accounting policy.

C. Promote increased producer association responsibility in technical, managerial and financial concerns.

(cont'd)

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☐ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☒ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or ☐ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Craig P. Buxton, USAID/Bissau

Carlos Schwartz, DEPA, Government of Guinea-Bissau

12. Mission/AID/W Office Director Approval

Signature

Typed Name James O'D Maher

Date 2/15/79

AID 1330-15 (3-78)

PES - PART 1 - ACCELERATED IMPACT PROGRAM FOR RICE PRODUCTION (AIP), #698-0410.02

BLOCK 8 (Cont'd)

D. Establish a documentation procedure at all levels of technical service.

E. Propose alternative methods to better allocate land under the project.

F. Incorporate more women in all phases of producer's association and in provision of technical services.

G. Include a plan to study subsistence and commercial potential for rice, sorghum and millet production.

BLOCK 11 (Cont'd)

Other participants in the evaluation included:

- Robert Hecht, Social Anthropologist (AID consultant)
- Henri Sellies, Hydrologist (FAO)
- Jacob Vos, Agro-Engineer (Dutch Government)

EVALUATION OF THE RICE PRODUCTION

ACCELERATED IMPACT PROJECT: GUINEA-BISSAU

INTRODUCTION

The Contuboel Rice Project, which encompasses two small rice perimeters at Contuboel and Saucunda cultivated in both the rainy and dry seasons plus a third perimeter at Sonaco, farmed only in the rainy season, is unique in Guinea-Bissau as the only example of intensive dry season irrigated freshwater Rice Culture in the Country. It is also one of the few agricultural schemes in Guinea-Bissau where animal traction is being introduced to small scale farmers. For these reasons, both the local Government and international aid donors are watching the Contuboel Rice Project with great attention.

The AID evaluation of the Contuboel Rice Project is significant not only because AID has already invested money in the scheme: it is also important because the Government of Guinea-Bissau intends to use Contuboel as a model for other rice production projects, and until now no one has done a serious and systemic critique of Contuboel. Hopefully, the evaluation will contribute to such a critique.

Basic data used to evaluate this project is derived from meetings and interviews with : farmers and their families; agricultural extension agents and technicians who are responsible for administering project activities; and with the Director of the government's Department of Rice Experimentation and Production (DEPA). In addition, two expatriate hydrologists, familiar with the project, offered their technical opinion of the overall irrigation operation (see Appendix B).

According to the Director of the Government's Department of Experimentation and Production of Rice, the main objective of the Contuboel Project is to increase the rice output of the peasants involved using selected seeds, fertilizer and dry-season irrigation to the point where they become self-sufficient in that important food. Contrary to similar projects elsewhere in West Africa, the government is not presently focusing on higher productivity to increase production for market, but supports efforts to help small scale farmers satisfy local consumption. Once subsistence needs are met, the government plans to expand support for market production.

Before 1960, Guinea-Bissau grew enough rice to satisfy its own demand and even exported small quantities of surplus rice. However, the combined impact of the anti-colonial war against the Portuguese and the economic hardship since independence has brought the production of rice to a dismal state. After 1960, the country became increasingly dependent on rice imports: as late as 1975 and 1976, rice imports totaled 13,000 and 11,000 tons respectively, and in 1977 - a drought year - food import needs skyrocked to 48,000 tons.

Government statistics, though fallible, show that rice production in the Bafata region, which encompasses the Contuboel Sector, declined from 7,400 tons in 1953 to just 5,200 tons in 1976. If this same downward trend embraces the sub-regional sector of Contuboel, then rice output there dropped from 1,018 tons in 1953 to 716 tons in 1976. Recorded rice imports to the sector reached 113 tons in 1976, or 13.6% of local consumption.

In order to combat this problem, the government, with the assistance of FAO, created in Contuboel in 1976, a Center for Rice Experimentation and Seed Multiplication. At the same time, the U.S., through the American Embassy in Bissau approved a small self-help project for U.S.$6,000, which started in January 1977. The object was to introduce dry season rice production on small perimeters located across from the Seed Multiplication Center's fields. Initially only 12 families showed an interest in the self-help effort. Each family was given approximately 5000 m2 (.5 hectares) but they worked collectively in preparing and maintaining the fields, dikes and canals. One technician from the Seed Multiplication Center and an agricultural extension agent helped the farmers to level and prepare the perimeters, use improved seeds, fertilizers and insecticides and improved farming practices. As a result, yields for the first dry season harvest of rice in the area, varied from 2.5 to 6 tons per hectare. Yields during previous wet seasons, using traditional cultivation practices, approximated 600 kgs. per hectare.

Having witnessed the process of the harvest in May 1977, over 300 farmers applied for entry into the pilot project. Further assistance was sought from the USAID office and, consequently with the cooperation of the Danish FAO rice technician at the Seed Multiplication Center, the self-help effort was expanded into an Accelerated Impact Project (AIP).

Approved August 31, 1977 for U.S.$275,000, the AID AIP design reiterated the government's aim of increased food production for peasant farmers. In addition, the AIP design

outlined two further objectives: the creation of a cooperative with financial responsibility for the irrigated perimeters, and the establishment of a farmer's credit union. Project inputs financed by AID include the construction of a warehouse-garage, four three-cylinder engines with pumps, plows, pedal operated threshers and, for animal traction, 25 pairs of oxen and wooden yokes. To support such an expansion, the government has increased the number of technicians and agricultural agents at the Seed Multiplication Center to 9 and 11 respectively. Three of the extension agents are also considered monitors because of their technical duties. All of the agricultural extension agents and three of the technicians at the Center are assigned full time to the project's three sites: Contuboel, Saucunda and Sonaco. Basic farming methods to support dry and set season intensive rice irrigation constitutes the major orientation of the technical services.

I. PROJECT SITE

A. Setting: Three communities comprise the project area. Two of the communities, Contuboel and Saucunda, practically face each other on opposite sides of the Geba River (see map page 29); moreover, they both fall in the same administrative sector, Contuboel and the political region of Bafata. Sonaco is further upstream on the Geba and, as a sector seat, falls administratively into the Geba region. The area's relief is rather flat with the river plain between 0 and 2%. Average annual rainfall is about 1500 mm. Soil types vary between sandy and fossil clay to sandstone and silica. Vegetation is typical of the Cassamance with palm trees, thick mangroves and the tall Kaya Senegal. All three sites are but 60 kilometers to the Senegal border. Using the preliminary national census taken this year under U.N. supervision, the following population data for the three communities is obtained:

TABLE I

	Houses	Households	Houses per Household	Residents	Res. per Household
Contuboel	500	443	1.28	2838	6.41
Saucunda	116	105	1.11	487	4.64
Sonaco	519	372	1.40	1912	5.14

Based on information from Project technicians and from peasants working in the rice perimeters, the ethnic composition of the three communities is as follows:

- At Contuboel the majority of residents are Mandinga with a large Fula minority, and small numbers of Balantas and Papels.

- At Sonaco, the situation is reversed, with Fulas making up over 50 per cent of the population and Mandinga forming a minority.

- Saucunda is an entirely Mandinga village.

The Mandingas of Guinea-Bissau are a western branch of the Mande cultural and linguistic group that spans Senegal, Gambia, Guinea, Mali and Ivory Coast. At various times in their history, the Mande have formed large state structures with a central administration, a powerful military force, and a social hierarchy of noblemen traders, craftsmen, and farmers. Most of these Mande states disintegrated well before the colonial period began in the late 19th century. Today, rural Mande are the archetypical farmers of the West African Savannah, raising millet, sorghum, maize, and peanuts. One group of the Mande living in the towns and know as Dyula (Dioula in French) play a major role in West African trading. The Mande, including the Mandingo of Guinea-Bissau are predominantly Muslim.

The Fula of Guinea-Bissau live in what was once the most westward province of the Fula (known in English as Fulani, in French as Peul) empire of Fouta Djalon founded in the Guinea highlands in the mid-18th century. This Muslim theocratic state, like similar Fula dynasties in Senegal, Mali, Upper Volta, and Nigeria, was more complex than the Mande Kingdoms. It had an extensive hierarchy of religious leaders, warriors, noblemen, craftsmen, herders, farmers, and capitves (macube). Although this hierarchy has been eroded by the economic and political changes of the colonial and post-independence periods in Guinea-Bissau, a significant pattern of social stratification still remains among the Fula.

B. Economy: Agriculture remains the matrix in which all other indigenous economic activity is set. Moreover, foodstuffs still account for the largest share of the value of goods and services produced. Staple foodstuffs are: grains, such as millet (mainly sorghum) maize, rice, fonio; roots, chiefly peanuts, yams, and manioc; and fruits, such as tomatoes, oranges, papaya, mangoes, and melons.

A major farming practice for both cereals and roots has been rotational bush fallow with some semi-permanent cultivation practiced along the Geba River and on small plots near

the village or compound. Rice farming before the project, which started in 1976, was limited to wet season farming. Farmers in the region grew rice in small shallow, hand-dug holes, packed together into a dense cluster. Rainwater is trapped in holes of 50 to 60 cm width and 10 cm depth, to irrigate the rice planted on the peripheral ridges.

Using livestock manure as fertilizer, this "pock-mark" technique brought typical yields of 400 to 600 kg. per hectare. Under this method, rice farming was exclusively women's work. Rice production supplemented other subsistence crops for local consumption. The principal cash crop is, as in the past, peanuts, which is grown primarily by men. To a lesser extent, palm nuts and some fruits and vegetables make their way to the market: either local; in Bissau; or across the Senegal border. In fact, the area's proximity to Senegal, and to a lesser degree Guinea, has always facilitated commercial exchange and labour mobility. Bananas, tomatoes and mangoes are sold more to Senegalese markets for CFA than in Bissau: this is increasingly the case with the advent of limited imports and the separation of the country's currency from the Portuguese escudo. Some peanuts may be sold in Senegal but most are marketed, along with sweet potatoes and tomatoes in Bissau. A greater part of agricultural production is subsistence and is derived from the application of human labor to land. The household, which is not always identical with the family, provides most of the workers. Seasonal labor migration is customary, especially during the less productive dry season. For reasons that are elaborated below, after the introduction of the project, there has been among participating farmers a noticable increase in population stability.

C. Project Results: By December 1978, the end of the 1978 rainy season, the Contuboel Project could claim to have achieved its first and primary objective of introducing irrigated rice culture to 150 families: moreover, 508 families were participating in the wet season using the same methods introduced during the dry season. The project has yielded the following results: (See table 2).

In the 1978 rainy season, 508 families cultivated 166 hectares, or an average of 0.33 hectares per family. Based on a non-random sample of 13 interviews with peasants at Contuboel, the average yield was 2194 kilos per hectare (See Appendix A).

In the dry season 1978, 195 families cultivated 80 hectares with an average of 0.41 hectares per family. The sample of 14 families indicated an average yield of 3896 kilos per hectare.

The main motivation for the enthusiastic participation of peasants in the project appears to be the exceptional yields compared with the old rice farming technique, the chronic shortages of marketed food in the region, and the farmers preference for rice as a staple food.

At Contuboel and Saucunda, parcels of land within the rice perimeter are, in principle, distributed to the families enrolled in the project in an equal and impartial manner. Moreover, each family has the right to cultivate its parcel and to dispose of the rice harvested on it, as long as the family farms the parcel every season. In other words, work confers ownership.

On matters of land tenure, actual practice is more complicated:

1. Since the perimeters at Contuboel and Saucunda are new, the layout of the parcels is being continuously reorganized. Farmers with parcels that fail to receive enough water during one dry season, for example are allotted different well-irrigated fields during the next season. Also, in November of 1978, it was decided that families on both perimeters who cultivated wet season rice on land outside of the irrigation pumping system in the dry season - 36 hectares at Contuboel and ten hectares at Saucunda - should be given a parcel within the pump-fed grid. This has meant that many families "own" 3000 m^2 of rice-land in the rainy season, but turn over 1500 m^2 of this land to another family which "owns" it during the dry season.

2. What it means to "work" the rice parcel every season in order to reaffirm ownership is a controversial question. According to one technician on the project, participating families must adhere to a rough production schedule or forfeit their land. When a family fails to prepare the parcel for flooding and planting by a certain deadline, for example, it loses the parcel which is then redistributed by the extension agents and committee president to a more diligent family.

At Sonaco during the 1978 rainy season, the first season that the perimeter was in operation, the land tenure arrangement was different. Since there was not enough time to subdivide the 40 hectare perimeter, the 87 families involved farmed it collectively and divided the harvest equally. Malan Sadjo, the technician in charge of vulgarization services on the project, explained that the arrangement at Sonaco was a temporary one, and that in the future each family would have its own parcel.

Within the irrigation system, the primary and secondary canals are built and maintained collectively by families on the perimeter, using only manual labor. Construction and upkeep or ridges surrounding a parcel are the responsiblilty of its owner.

In the dry season, water pumped from the Geba River into the perimeter at Contuboel and Saucunda is allocated among the various parcels according to need calculated on a supposedly systematic basis by the extension agents. At Saucunda, an average 3000 m^2 parcel is irrigated once a week for an hour. Fields located on higher ground are irrigated twice a week, and poorly drained low-lying parcels are watered once every two weeks or even less frequently.

On the average, one hectare of irrigated rice requires 15,000 cm^3 of water. A two-cylinder motor (Cerres or Lister) can pump a maximum of 250-300 cm^3 an hour and a three cylinder motor (Lister) 350-400 cm^3 per hour. Both motors should support up to 25 hectares. Each pump has a full time operator and a part-time mechanic. To date, the Seed Multiplication Center manages, services and pays the fuel costs for the nine pumps located as follows:

Type of Motor	Location
Lister 3 Cylinder	1 Saucunda, 1 Center, 2 Contuboel
Lister 2 Cylinder	1 Contuboel
Cerres 2 Cylinder	1 Saucunda, 1 Center, 2 Contuboel

Hand-tools, including long and short-handle hoes (for women and men, respectively), knives, and machetes, are owned by individual families. All of the animal-drawn equipment, including the SISCOMA rice seeders, plows, and donkey carts, plus the SISCOMA pedal-driven threshing machines are held by the FAO Rice Multiplication Center directing the project. The Center's mechanization division, in coordination with the vulgarization division, loans out this equipment to peasants at no charge on a first-come, first served basis. The center has two pairs of oxen for demonstrating and training techniques of animal traction. Two enterprising families at Contuboel have also purchased and trained their own oxen to plow other peasants' fields, for a fee of 300 pesos (about $9.00) for a half-day of work.

Present project inputs remain in the form of labor intensive methods that require basic, low intensity capital and technological assistance: diesel powered pumps; improved seeds, fertilizers and the use of pesticides and simple farm equipment; and, the technical advice of extension agents and technicians throughout the cultivation and harvest. Extension agents trained at the Seed Multiplication Center or elsewhere in the country, and under the supervision of a technician, distribute and instruct the use of basic materials.

During both the wet and dry season, a family with .3 hectares will receive 22 kilos of seeds, .6 liters of insecticide (malation), 45 kilos of NPK fertilizer and 60 kilos of urea for each tillage. A number of the farmers on the project are using the rice seeders, donkey-carts and pedal-operated threshers.

Except for the seeds which are furnished by the Center and paid in kind at harvest by the farmers, virtually all the equipment, materials and technical services are supplied by the government at no cost to the farmer. Moreover, actual costs borne by the Government are still confined to salaries and logistical support. Everything else is supplied by a number of donors, primarily FAO and USAID.

A greater part of this assistance supports DEPA's seed multiplication Center and, in turn, its support and administration of project inputs.

Because most rice production is still at a level of subsistence, there is little finahcial and economic data available to determine production and market value. Instead, a number of farmers calculate their yields from the number of 100 kilo sacks harvested and stored. For the purpose of evaluating monetary value of production, these estimates are used along with information supplied by the FAO technician. The opportunity cost of labor is based on alternative employment, primarily as labor at the Center or in Senegal. Average wage alternatives are about 35 pesos (a little over U.S.$1.00) a day.

Government officials, technicians, extension agents and peasants all agree that the rice perimeters in the Contuboel Project are farmed using "family" labor. The meaning of "family" in this context is complex, however, and the identification of the family unit assigned a parcel and of the family unit which actually farms it, is no simple-minded task.

According to the preliminary 1978 census, there are 443 families in Contuboel, or an average of 6.42 per family.

Data gathered for the AID evaluation yield a very different result, however. Peasants in their fields were asked, "How many persons are in your family?" "How many of you eat together?" or (in the appropriate case) "You are the head of a household of how many?" The replies at Contuboel varied between 7 and 32, with an average of 15.5 persons per "family".

How is the discrepancy between the census and AID field data to be explained?

Among both the Mandinga and the Fula, extended family ties, especially those of blood and marriage through the male line, are of great importance. Fathers, sons, brothers, and paternal uncles, nephews and male cousins often live, work, and eat together, and even "inherit" each others wives. This is indeed the case at Contuboel.

Thus for the census-taker, the 445 families probably correspond to the "modern" conjugal family, consisting of a man, his wives, and children. On the other hand, the larger "families" of 15 or 17 that the peasants described in field interviews can almost certainly be equated with the more extended cluster of patrilineal relatives.

On the Contuboel and Saucunda perimeters, interview data show that some plots are indeed worked mainly by a conjugal family - a "census family". In 7 of 14 cases recorded, the major labor unit consisted of a man, his wives (from 2 to 5), and unmarried children (see Table 3).

In the other seven cases, plots were farmed by more complex groups of kin. There were two examples of stem families - a man plus his married sons, their wives and children - laboring together, and five cases of joint families - several collateral male relatives plus spouses and children - working as a unit.

Field interviews also revealed several instances when a single complex family, producing and consuming as a unit, was farming more than one irrigated parcel. Technicians at the FAO Center say that there are 314 families participating in the project at Contuboel, but this simply means that 314 different individuals were assigned plots. It appears that in a number of cases, two or more of these individuals belong to a single producer/consumer group, and that the total number of producer groups at Contuboel is therefore much less than 314.

Family labor aside, there are other forms of mutual assistance. Men frequently work in groups of three or four - generally friends or neighbors - to prepare the rice fields for flooding. At Saucunda especially, women form larger teams of 8 to 15 persons of roughly the same age, known as Bulukafo, which move progressively from one member's field to another's, preparing the soil, planting the young rice shoots, weeding the parcels, and so on. The highest form of collective labor, of course, involves all the peasants on a perimeter in the construction and repair of the main canals and drainage ditches.

Actual labor costs for producing one hectare of rice under the project are calculated as follows:

Activity	Days
Land Preparation	7
Seeding	3
Transplanting	23
Weeding	37
Harvest	3
Hulling	7
Total	80

Using the opportunity costs for labor of 35 pesos a day, the value of labor to produce one hectare of irrigated rice equals 14,000 pesos (or 80 days x 5 workers x 35 pesos). The costs of materials, technical services and irrigation are:

Material	Quantity	Unit Cost	Total (pesos)
Seeds	73 kgs.	7.5	548
Insecticides	2 litres	75	150
Fertilizers			
NPK)	150 kgs	6	
Urea)	200 kgs	3	1500
Technical Service[a/]			
Agricultural Extension		2500 / 10 Hectares	250
Technical Extension		21000 / 166 Hectares	127

a/ Based on an average of one agent who receives 2500 per month and works 10 hectares per season.

Equipment and Maintenance[b/] (excludes costs for irrigation)	5000
Irrigation[c/] (includes operating and maintenance costs) 43 hrs. x 117	5031

Using these prices and the information in Annex A which presents the average yield per dry season, a rough estimate can be made of the benefits accrued to the individual farm. With the average yield of 3896 kilos per hectare, and the recent official market price for rice at 14 pesos (40¢) per kilo, an individual farm should, after paying production cost- of 26606 pesos ($760), net 27938 pesos ($798).[d/]

Each of the three perimeters has a producer's association whose membership consists of all the families growing rice on the perimeter. The association chooses an executive committee of three or four persons which acts as a liaison between the producers' group and the technicians, monitors, and extension agents from the FAO Center. In this sense, the association, the committee, and the Center's staff form the overarching component in the organization of production.

The committee confers frequently with the Center's staff, transmitting questions and complaints from the farmers. Then it meets with the farmers and passes on information and instructions from the technicians. At this stage in the project's evolution, most of the information flow seems to be from the top downward' the relationship risks stifling farmer cooperation with an excess of externally imposed control.

At Saucunda, the head of the association is also the political counselor of the PAIGC, Guinea-Bissau's sole political party, in the village; at Contuboel none of the four members of the executive committee has any party functions. There is apparently no connection between the producer's association and the Tabanca (village) committees, the lowest level of PAIGC organization in the country.

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b/ Calculated on life of small equipment and maintenance.

c/ Determined as follows: equipment, spare parts, maintenance depreciation, fuel and labor ÷ 7,500 hrs. = 117 pesos.

d/ An exchange rate of 35 pesos = U.S.$1.00 is used throughout this evaluation.

Even though the Contuboel Rice Project has brought about a dramatic increase in rice production on the three perimeters, it appears that nearly all of this rice is being consumed by the peasants, with very little of the grain being sold either through private traders or through the state-owned People's Stores.

Using official statistics, we can calculate average per capita rice consumption in the Contuboel sector in 1976 at 53.2 kilos unhulled, and at 22.1 kg. in the Sonaco sector (see Appendix 2). Both of the figures should be considered as underestimations, because government figures report only rice sold to the public through the People's Stores.

In an effort to bolster rice production and its commercialization, the government recently raised by 20 per cent buying and selling prices. Current prices paid to the farmer by the People's Stores are 17 and 13 pesos per kilo and respectively per 1st and 2nd grade quality. Selling prices are 22 and 18 pesos for imported 1st and 2nd grade and 15 and 14 pesos for 1st and 2nd grade respectively.

According to collected field data (see Appendix 3), current per capita rice production on the Contuboel perimeter could be as high as 284 kilos unhulled (170 kilos hulled). The Guinea-Bissau government states that nationwide consumption of rice is roughly 100 kilos per person. If nearly all of the rice is eaten by the producer group, this would mean a five or six-fold increase in rice consumption.

Officials in the agriculture ministry say that a considerable increase in rice consumption has been observed in the three communities participating in the Contuboel scheme, which tends to support the figures cited above. Moreover, when three farmers interviewed at Contuboel were asked "How many months will the rice you harvested this year last for your family?", their responses indicated a desired annual per capita consumption level of 266 kilos, 250 kilos, and 200 kilos, respectively.

II. POSITIVE SOCIO-ECONOMIC FEATURES

The Contuboel Rice Project has at least eight important positive features:

(1) Higher Yields - Higher Living Standards: The recently introduced irrigated methods of cultivation using improved rice strains from the FAO Center have led to a considerable boost in rice production. Per capita rice output may have increased by five or six times as a result of the Contuboel Project. Assuming that this surge in rice production has not been fully offset by a drop in sorghum, and peanut production (see Part III), peasant incomes and living standards should also have improved.

(2) No Indebtedness: The increase in peasant rice production has occurred without the farmers becoming heavily indebted, either to a state organization (as with peasant cultivators on the large SAED perimeters in Senegal) or to private moneylenders (as in parts of the Far East, e.g. Indonesia). This, of course, is because the peasants at Contuboel have only had to pay for seeds and for their own labor (opportunity costs). All of the other inputs have, in effect, been paid for with government and foreign aid subsidies.

For the short run, such a heavy-subsidy approach has the positive effect of making peasants more receptive to the new rice-growing technology introduced at Contuboel. Over the long-term, however, it could have serious negative repercussions, both for the pilot scheme at Contuboel and for any expanded rice production scheme using Contuboel as a mode (see Part III)

(3) Equal Opportunity/Equal Land Distribution: The Contuboel Project has provided an equal opportunity to all peasant farmers in the three communities involved to enroll in the rice-growing operation. At least in Contuboel and Saucunda (the two communities most closely evaluated), all families which gain most of their livelihood from farming are eligible to participate. Only families deriving most of their income from the civil service or other salaried posts, commerce, and crafts are excluded from the project.

The distribution of land among the inscribed families has been relatively egalitarian, too. Most families receive 0.3ha for rainy season production; and starting this year in the dry season, since irrigated land is scarcer, the pump-fed perimeter will be subdivided in a roughly equal manner among all the farmers (this subdivision is subject to the approval or rejection of the peasants' association).

Nevertheless, problems concerning the equal allocation of land remain. These arise from the variable size of families, the difficulty in identifying the family labor unit with the right to one parcel, and perhaps also from continued discrimination against low-status Mandingas and Fulas (see Part III).

(4) Population Stability: Lower Outmigration:

The success of the Contuboel Project, at least in the short run, is manifested in falling rates of outmigration from the communities involved, that is, in a stabilization of the rural population. To be sure, long-term outmigration from the Contuboel sector during the early 1970's was caused mainly by the war between the Portuguese and the PAIGC (UNHCR reported in 1974 that there were 90,000 Guinean refugees in Senegal), and since the war ended many of these exiles have returned. But it appears that the Contuboel Project has also managed to reduce seasonal labor migration to Bissau, Dakar, and to the Casamance (southern Senegal), which had persisted even after independence in 1974.

There are no statistics available to back up this assertion of reduced seasonal migration, but the testimony of dozens of farmers at Contuboel supports this view. In three cases, peasants interviewed in the field stated that before the Contuboel Project was established they themselves spent the dry season looking for work in Senegal and in Guinea-Conakry as fishermen, laborers, or mine-workers: now they were remaining at home to help out with tasks in the rice fields. Another farmer said that "before (the project) in the rainy season, all of the young men went to Senegal for the peanut harvest, and in the dry season they left again to look for odd jobs. Now not so many go to Senegal in November (peanut harvest), and most of them stay here for the dry months."

(5) Choice:

Peasants in the communities of Contuboel, Saucunda and Sonaco had the right to choose whether to join the project or not. They were in no way compelled to grow irrigated rice in the off-season, as with many farmers in the Senegal River Basin. In fact, in early 1977, when the Project started on a very modest basis, all but 12 of the 150 families that signed up for rice plots backed out of the scheme because they expected it to fail, and none of these families was punished or reprimanded. When there is no element of compulsion behind such an agricultural scheme, the peasants who actually join it must be convinced that it is worthwhile.

(6) Low Risk: Bacause a typical family in the Contuboel Project only commits about 80 person-days of labor to rice cultivation each (the estimate is probably high, too: research in the Senegal River Basin puts the figures at 66 person-days), it still has sufficient time to grow millet, sorghum, maize, peanuts, manioc and the various fruit and vegetable crops that it normally consumes and commercializes. Therefore, the risks involved in enrolling in the Contuboel Project are relatively low. And since peasants in Guinea-Bissau are justifiably risk-averse, the project represents an attractive opportunity to them (especially with the government ready to absorb most of the losses in case of failure).

(7) Small Organization: The organizational structure responsible for the Contuboel Project - the three producers' associations with their committees and the FAO Seed Multiplication Center - is relatively small, and this is another key to the Project's successful operation. (In contrast with SAED, the large Societe pour l'Amenagement et l'Equipement du Delta, which has jurisdiction over the Senegal River Basin, and which suffers serious logistical, communications, and managerial problems because of its bigness).

Because the Contuboel organization is small, logistical operations such as supply of material and transport are handled with a minimum of disruption and delay. Since the communications link between the peasants and the FAO's Center's decision-makers is short, information moves quickly and efficiently from the top of the organization to the bottom and vice versa. Technical and social problems on the perimeters are picked up almost immediately by the Center's staff which can then attempt to resolve them. Finally, relatively little managerial expertise is required to run the Contuboel Project compared with a large agro-industrial enterprise; and since Guinea-Bissau has few trained managers, this too is an advantage.

(8) Good Extension Work: Overall, the extension services provided to peasants on the three perimeters appears to be good. The failure of extension workers and technicians to document and carefully analyze the development of the Contuboel Project is a serious weakness (see Part IV); this criticism aside, however, the technical staff on the project appears to be reasonably well trained and motivated, and has developed an intimate, trusting, and informal rapport with the rice farmers.

The technicians and extension agents seem to mix well with the farmers, even though only 5 of the 27 "functionaries" at the Center come from the Sonaco and Contuboel sectors. Most of the technicians and extension agents working in the rice fields speak either Fula or Mandinga, and those who don't can still get by with Creole, the country's lingua franca. Their actions and statements also reflect their respect for the peasants, and not an arrogant air of superiority which would so quickly alienate the farmers from the functionaries.

More than one peasant interviewed praised the extension agents for their work, and one Fula woman said that she "had complete faith in the people (at the Center) because they have helped her family to grow so much rice, while using the old methods the rice fields were always flooded and ruined."

III. PROBLEMS

Balancing off the positive aspects of the Contuboel Project, there are also eight constraints or problems in the socio-economic domain:

(1) Land Shortage: Because of the limited number of pumps, the irregular topography of the perimeter, and the mediocre quality of the irrigation layout, the total number of hectares under cultivation in the dry season has not kept pace with the increasing number of peasants being admitted to the Project. Consequently, the average size of family rice plots is decreasing, while per capita yields languor.

At Saucunda, last year, for example, 68 families cultivated 22 hectares of rice fields, or an average of .32 hectares per family. This year, the village producers association decided that all 108 families participating in wet season rice farming ought to have a share of the dry season perimeter, thus reducing the average plot size to .20 hectares. A number of peasants interviewed at Saucunda explained that their parcels were being subdivided in order to give portions to their less fortunate co-villagers.

With this subdivision leading to lower per capita rice production, few families in the Project have enough rice to last throughout the year. One farmer with 24 persons to feed stated that his rice crop was depleted in just over two months. Actually, reduction in per capita production results from not only further subdivision but also from increased population per family plot. Extended family of project participants have come to project sites to share the increased production of rice.

(2) Falling Peanut Production: Nearly all peasants agree that since the Contuboel Project got underway two years ago, their production of peanuts, traditionally the main cash crop, has fallen off.

There are two explanations for this. First, most farmers say that work in the rice fields has cut into the labor time which used to be allocated to peanut cultivation. Some small families have stopped growing peanuts entirely, and even large families have curtailed their peanut output.

Second, the war for independence waged against the Portuguese and the economic difficulties of the new Guinea-Bissau nation since 1974 have resulted in serious food shortages and occasional periods of famine. Therefore, peasants have been inclined to switch out of cash crops to exclusively food crops, and the Contuboel Project presented a golden opportunity. As one peasant stated "Since the war, there has been no rice or millet for sale in the region. With peanuts you gain money, but there's no food to buy with that money." In other words, peanuts may have a higher monetary value than rice, but under recent circumstances rice has a much higher subsistence value than peanuts, and this factor is primordial. Moreover, the presently assigned monetary value for peanuts does not equate with actual purchasing power generated from sales.

In some ways, the fall in peanut output as a result of the Contuboel Project may not be a problem; indeed it can be viewed as a rational and beneficial strategy adopted by the farmers. It could become a problem, however,

- If manufactured goods and food stocks do reappear in stores in the near future, and if peasants then find that the purchasing power of their rice is lower than the purchasing power of peanuts (price policy is important here). In this case, they may simply continue to grow rice and absorb the fall in oncome and purchasing power; or they may cut back their rice production, thus throwing the Contuboel Project into jeopardy.

- If the Guinea-Bissau government wants to encourage peanut production. Peanuts are traditionally the country's chief export commodity, and there are clear indications that the current government would like to see peanut exports rise in the next few years.

- If the government drops its future plans to increase rice production for market and export. This is highly unlikely given the country's comparative advantage in rice production in relation to neighboring rice importing countries.

(3) Real Costs and Sorghum Production: The implantation of the Contuboel Project has also resulted in a certain decline in the production of sorghum, along with rice, the staple food of the region.

A certain part of the attractiveness of rice has to do with the cheapness of the inputs for the farmer. The government and foreign aid donors are presently subsidizing nearly all the factors of production, except for the peasants' labor and the seeds.

A problem could well arise if in the future, peasants are expected to pay for some or all of the inputs. (Officials of the Ministry of Agriculture suggest that they plan to ask for payment, and it appears unlikely that foreign and/or government subsidies to irrigated rice production will continue indefinitely). In this case, peasants may find that it costs less to grow sorghum than rice in the rainy season, and they will therefore drop rice cultivation (Farmers in the Senegal River Basin, for example, seem to prefer farming millet over rice in the rainy season). As part of the diet, rice is, however, preferred to sorghum. Moreover, there is little possibility of sorghum production affecting dry-season production of rice.

Many peasants interviewed in their fields were surprised to learn that they might have to pay for a greater share of inputs in the future. Generally they stated that they would continue to grow at least some irrigated rice in the wet season, even if rice became relatively more costly to cultivate than sorghum, though they might have to reduce their rice output. Few stated they would reduce rice production in the dry season even if they were required to pay for production costs.

Regardless of relative price arguments, it appears that most peasants prefer to follow a food crop diversion strategy. Growing two food crops instead of one reduces risks of failure, and whatever it costs to grow rice, peasants in the Contuboel region prefer to eat rice over sorghum.

(4) Free Hand-Outs and Producer Responsibility: In addition to the absence of farmers' cost accountability (see (3) above), which could have serious future repercussions, there is also a conspicuous lack of responsibility for the Contuboel Project incumbent upon the producers and their association. The technicians at the FAO Center make nearly all the decisions concerning the operation of the perimeters and provide all of the maintenance services for the project equipment. This appears to be an important weakness of the Project.

Technicians at the FAO Center argue that the peasants at Contuboel, Saucunda, and Sonaco "are not ready" to assume major economic, technical, and managerial responsibility for their perimeters. This point of view contains some truth - the technology of intensive irrigated agriculture is new to the peasants and few of them are literate or have a managerial background - but it is only partly convincing.

While the peasants cannot be expected to take over the entire rice perimeter operation on their own - minimal outside assistance would probably have to include a diesel pump, technical advice on irrigation, and extension services on pest and disease control, fertilizers, etc. - it seems reasonable and desirable that they should begin to play a larger management role. For instance, the producers' associations could nominate members to be trained as pump monitors and as extension agents; they could start paying for diesel fuel and oil; and they could police and chastise their own recalcitrant members, instead of relying on the technicians to discipline them.

(5) Conflicts at Contuboel: The Contuboel perimeter in particular is suffering from some serious technical and social problems, which are manifested in

(1) Poor cultivation practices and lower rice yields than at Saucunda and Sonaco. At Contuboel many of the parcels were planted too late this year and the rice did not have enough time to mature.

(2) Tension among the members of the producers association and disputes at association meetings, with factions forming behind the four "presidents" making up the executive committee.

These problems at Contuboel appear to be caused mainly by technical factors, namely the irregular topography and poor irrigation system on the perimeter which results in the inundation of some parcels while others remain high, dry and unproductive.

The technical factors have also caused a certain amount of hard feeling to arise among families with well-watered parcels and those with poorly irrigated plots, exacerbating old rivalries between groups and families,

especially between the Fula and Mandinga ethnic populations. A number of farmers interviewed at Contuboel about the lower economic performance and social tension on their perimeter said that this was caused by the ethnic heterogenity of producers. At Saucunda, they added, a homogeneous Mandinga population could organize more effectively and without infighting.

The Contuboel perimeter (94 hectares) is also larger than at Saucunda (32 ha) and Sonaco (40 ha), and this makes its management as a simple unit more difficult.

It is hard to devise a simple solution to these problems at Contuboel, especially since their nature and causes were not completely unraveled during the brief field work period. Hopefully, an expansion of the perimeter, providing each family with more land, plus an improvement of the existing irrigation network, would eliminate most of the difficulties. In addition, the division of the perimeter into a series of autonomous 25 hectare blocks with their own associations would make their management, both socially and technically, an easier task.

(6) Inferior Women's Role

The successful implantation of the Contuboel Project does not appear to have changed the economic status of women in the communities involved. That is to say, she remains economically subordinate to her husband or father, as the case may be. And neither the PAIGC, which says that it is committed to greater equality between the sexes, nor the producers' association is taking steps to improve women's position. These developments clearly contradict the assertion in the AID Accelerated Activity Paper that women "will be major beneficiaries of the project".

Under the old "pock-mark" system of rice cultivation, women performed virtually all of the work. The harvested rice was entirely consumed by the family, so there was no question of who would dispose of revenues from the sale.

With the new intensive irrigation methods, women work about as many person-days during the rainy season as before (two women interviewed said that they actually work less in the irrigated perimeters). And since no rice was grown in the dry season before 1976, they obviously supply many more person-days of labor to dry season cultivation. Women said in field interviews that they used to spend this time making pottery and "taking trips to visit friends and relatives".

With the advent of the Contuboel Project, men are now also working in the rice perimeters in the dry season performing all the same tasks as their wives, daughters, and sisters. Many of the participants in the Project plus the technicians pointed out this innovation in the division of labor in rice cultivation.

Prior to 1976, men spent the dry season weaving mats, repairing houses, tapping palm wine, or on migration to Senegal in search of salaried employment.

Men are making a more modest contribution to the rice-growing tasks during the wet season, when they also have millet, sorghum, peanuts, and maize to look after. One man interviewed, however, said that he divided wet season tasks not on the basis of sex but of age: He and his wives tended the rice while his children cultivated the other crops.

Traditionally, both Mandinga and Fula women in the Contuboel region have been largely under the economic control of their husbands if married, or fathers if unmarried. In a similar way, unmarried sons as a rule - and even married sons and brothers in joint and stem households - fall under the economic jurisdiction of their fathers and older brothers, who feed them, pay for their clothes, schooling, taxes, etc.

Nevertheless, married women do have primary responsibility for the upbringing of their children and for domestic (in a social and spatial sense) affairs in general. They own the various food preparation and cooking implements, which they can sell or pass on to their daughters as they choose, and frequently they are also the proprietors of cattle, sheep, and goats. Women also market tomatoes, onions, peppers, and other garden crops, and they dispose of the sale proceeds as they wish.

All men and women in the rice perimeter queried about women's economic status in the Contuboel Project said, however, that if a family started to produce an appreciable surplus of rice in the future, it would be the male household head, not his wives, who would sell the rice and control the monetary revenues.

If this turns out to be the case, the question is merely hypothetical at present, since little rice is marketed. Men's intervention in the large-scale commercialization of rice could be viewed as a "missed opportunity" for women to achieve economic parity with their male counterparts, but it should also be understood more as a maintenance of the status quo than as a sign of a regression in women's economic standing in the Contuboel Region.

If either the PAIGC or the producers' association were serious about giving women more economic clout and autonomy, steps could be taken within the context of the Contuboel Project to promote this aim; including

- Training women as extension agents and agricultural technicians.

- Creating women's cooperative rice plots, the proceeds of which would accrue to the women, not to their husbands.

- Promoting women's active participation in the activities of the producers' association.

(7) Land Distribution: Even though the framers of the Contuboel Project - the technicians at the FAO Center - are sincerely dedicated to the principle of equal land distribution to all peasant participants, and have therefore tried to allocate land on the basis of the number of persons in each family, there are still cases of skewed land distribution. Among the families who submitted to field interviews, for example, there was one with eight members and 0.6 hectares, and another with 32 members and less than 0.3 hectares.

Interviews also revealed cases where two or more members of a single family - in the sense of being a single producing and consuming unit - had obtained parcels in the rice perimeter. A powerful Mandinga Malam - Muslim religious guide - in Contuboel had managed to secure plots for five of his sons, for example, plots which were labored by the sons plus dozens of his Koranic students.

What is needed to attenuate this land distribution problem is an accurate and incontrovertible census of all the "economic families", or consumer units, belong to the Project. Then land can be allocated fairly as a function of consumer group size. Of course, the producers' association for the perimeter will have to patrol its own membership in order to ensure that the census information is honestly reported.

(8) Documentation-Feedback: The current absence of a reliable census of the families participating in the Contuboel Project is but one part of the generally poor documentation of the Project, especially its peasant perimeter component. Aside from the list of names of the supposed proprietors of each parcel and the amount of fertilizer they receive each season, the extension workers and technicians keep no written records on the peasant rice producers. This lack of documentation makes it more difficult for them to follow the progress of the Project and also to perceive and analyze individual peasant problems and more general snags in the perimeters' operations.

At a pragmatic minimum, it would seem to be in the technicians' best interest to keep

- a census of all families growing rice
- a production chart on each plot, including the number of workers, parcel size, rice yield and remarks on problems of irrigation, pest and disease control, peasants' work habits, etc.
- a notebook for each diesel pump for recording daily operating times, fuel and oil consumption, and perhaps some readings of the water level in the Geba River.

Conclusions

The Contuboel Rice Project should be regarded as a success by a number of socio-economic standards. The project has brought higher per hectare rice yields, higher per capita consumption, and thus near food self-sufficiency to hundreds of families in the communities of Contuboel, Sonaco, and Saucunda.

In a region where rice had never been grown during the dry season, the Project has in less than two years elicited the enthusiastic participation of 509 families in the three irrigated perimters, far surpassing the target of 150 families set out in the AID Accelerated Impact Paper - and there are many more families clamoring to join. For example, a spokesman for the village of Jabicunda, located just south of Contuboel, said that at least 500 persons in 70 families had asked him to try to persuade the technicians at the FAO Center to install an irrigated perimeter for them.

The active participation of the peasants in the Contuboel region in the Project appears to stem most directly from the impressive rice yields obtained in the dry season (traditionally a period of underemployment), coming especially after years of chronic food shortage due to the anti-colonial war, economic crisis and drought.

But there are other factors, too, favoring the enthusiastic Response of Fula and Mandinga farmers to the Project: the absence of indebtedness, non-compulsion, low risks, and small-scale ogranization. The project has also had a number of additional salutary effects, including the fairly equal distribution of land, stabilization of the rural population, and the provision of more employment, especially during the dry season.

At present, the Contuboel Project has not given birth to two additional "outputs" cited in the Accelerated Activity Paper:

(1) An "Agricultural cooperative to ... purchase fuel, spare parts, maintain motor pumps and animal traction material, and other equipment as required".

(2) A revolving credit fund.

The notion of establishing a credit union so early in the Project may have been unrealistic, but the idea of a cooperative with some financial and technical responsibility seems reasonable and healthy, and the failure to set up such a cooperative highlights one of the main problems that the project faces. Under the current arrangement, foreign donors and the Guinea-Bissau government, through the FAO Center, provide all of the materials, services, and management expertise to the Projects. Peasants basically just accept the material handouts and follow instructions.

There appear to be two other serious and pressing problems. First, the present cost accounting practices of the Contuboel Project may be creating an overly-optimistic picture of the relative attractiveness of rice cultivation. If farmers are asked to pay for more inputs in the future, they could well reduce their rice output in favor of peanuts and sorghum. Second, the absence of any systematic documention of the Contuboel Project makes it difficult for technicians and planners to evaluate and upgrade this pilot rice growing scheme.

Finally, the Government of Guinea-Bissau should be aware of the potential conflict between its short-run objective of farmer self-sufficiency and its long-run goal of eliminating rice imports. In order to wipe out imports, rural farmers will have to produce a surplus to feed the urban non-rice growing population. Pricing policies or more compulsory measures could be used to try to induce this surplus, but it is possible that government planners will encounter significant non-cooperation from farmers, who prefer to spread their risks among a variety of crops instead of becoming rice monoculture producers.

SUMMARY

The Contuboel Rice Project has achieved a major success in enlisting the support of rural peasants in two-season intensive irrigated rice cultivation. The original target of enrolling 150 peasant families has been easily surpassed.

The major benefits of the Project are

- higher rice yields, per capita consumption
- greater employment opportunities and lower seasonal outmigration.

Important problems must be resolved, however. Their solutions devised and tested before the complete success and likely diffusability of the Project to other parts of Guinea-Bissau can be claimed. These problems include

- The lack of financial accountability for project costs by peasant producers.
- The absence of real technical and managerial responsibility exercised by the producers' association.
- The failure to consider taking measures which could capitalize on the Project to improve women's economic state.
- The poor existing system for documenting the evolution of the peasant perimeters.

RECOMMENDATIONS FOR IMMEDIATE IMPLEMENTATION

It is recommended that the Contuboel Rice Project continue to improve the activities on the three perimeters currently in operation, at least for the near future (10 to 12 months), until the following socio-economic conditions are fulfilled:

(1) A definitive accounting procedure is instituted and tested.

(2) The producer associations take on more technical and managerial, as well as financial, responsibility.

(3) A documentation procedure is set up.

(4) A better system for allocating land is established.

(5) The question of building mechanisms designed to improve the economic status of women on the project is fully debated, resolved and translated into practice. For example:

    (1) Nominate women for training as agriculture extension agents and technicians a/

    (2) Examine the possibility of collective parcels for women.

USAID/Bissau is taking steps to provide DEPA this year with technical and material support to address the above conditions. Included in this support are commodities and technical services which will permit the project's technicians and participant farmers to effectively measure, calculate and document (a) water related data, (b) production and costs, and (c) general socio-economic variables affecting the allocation of land and distribution of costs and benefits. Measures introduced to improve current opearations should be enhanced by the recent arrival of a FAO agronomist assigned full-time to the project. In addition, a FAO hydrologists has already begun to design a practical system to determine the effect of irrigation on the Geba River.

a/ Women should also benefit from the literacy campaign being organized for commencement March 1979.

RECOMMENDATIONS FOR THE DESIGN OF PROJECT EXPANSION

In general the Rice Production Project should serve as an effective model for expansion and replication of similar project activities. A major concern of the design team should be to insure proper development of the positive experiences gained under the present project. Thus appropriate expertise on the design team should address the following:

(1) Preparation and management of the topography of the perimeters, the irrigation layout and the allocation of land per pump, extension agent and producer's association.

(2) Actual and potential market for rice, sorghum and millet production.

(3) Economic performance and social relations within and between producer's associations, and their role in the development of agricultural cooperatives.

(4) Arrangement for a cost accounting system which places all of the project's financial and credit operations in the hands of the producers.

Even with the measures presently being taken by AID to help resolve existing problems and improve general project operations, mechanisms designed under the new project should accomodate the types of problems and constraints that arose during the initial project. Increased participation in irrigated cultivation must be of clear benefit either in terms of cash income or a larger supply of family food. More important, the general orientation of expansion and replication should remain with small-scale agricultural intensification.

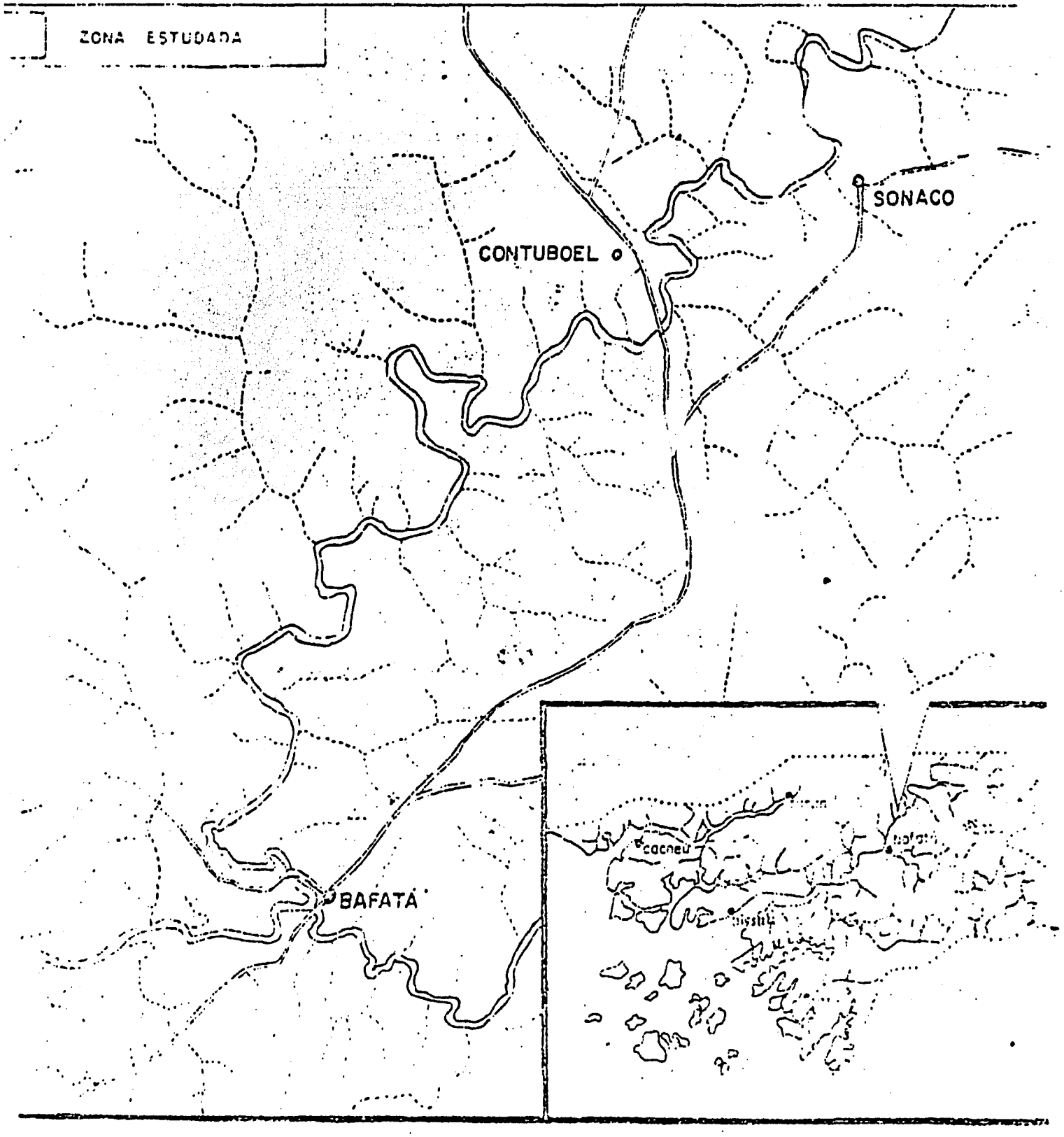
Ten new perimeters with a total of about 1600 hectares have been identified by the GOGB for consideration under the new project. Most of the land is located along the Geba River, primarily between Contuboel and Sonaco. Several perimeters are in the south next to the newly established agricultural extension station in Caboxanque. Roughly 100 families per 60 hectares of rice and 100 hectares of extensive sorghum and millet will constitute the 10 perimeters. Additional land will be added to the existing perimeters at Contuboel, Saucunda and Sonaco. FAO has tentative plans to support increased activity at the Seed Multiplication Center. They also intend to introduce new and improved varieties of sorghum and millet.

TABLE 2

	WET SEASON 1978				DRY SEASON 1978			
	Number of Families	Number of Hectares	Hectares Per Family	Est.Avg. Yield per Hectare	Number of Families	Number of Hectares	Hectares per Family	Est.Avg.Yield Per Hectare
CONTUBOEL	314	94	0.30	2194 Kgs	127	58	0.46	3895 Kgs
SAUCUNDA	108	32	0.30	-	68	22	0.32	-
SONACO	87	40	0.46	-	0	0	0	-
TOTALS	509	166	0.33	-	195	80	0.41	-

TABLE 3: FAMILY COMPOSITION

CODE	FAMILY SIZE	CONJUGAL FAMILY (Husband, wives, Children)	STEM FAMILY (Father and Sons, Children)	JOINT FAMILY (Collaterals & Children)
#1	8	(H&2W)		
#2	24		(F&2S)	
#3	7			(2B)
#4	20	(H&3W)		
#5	15			(FB&BS)
#6	18	(H&5W)		
#7	--		(F&5S)	
#8	8	(H&3W)		
#9	7			(FBS&FBS)
#10	7			(FB&BS)
#11	9	(H&2W)		
#12	32			(4B)
#13	10	(H&2W)		
#14	18	(H&4W)		
Number of Cases		7	2	5

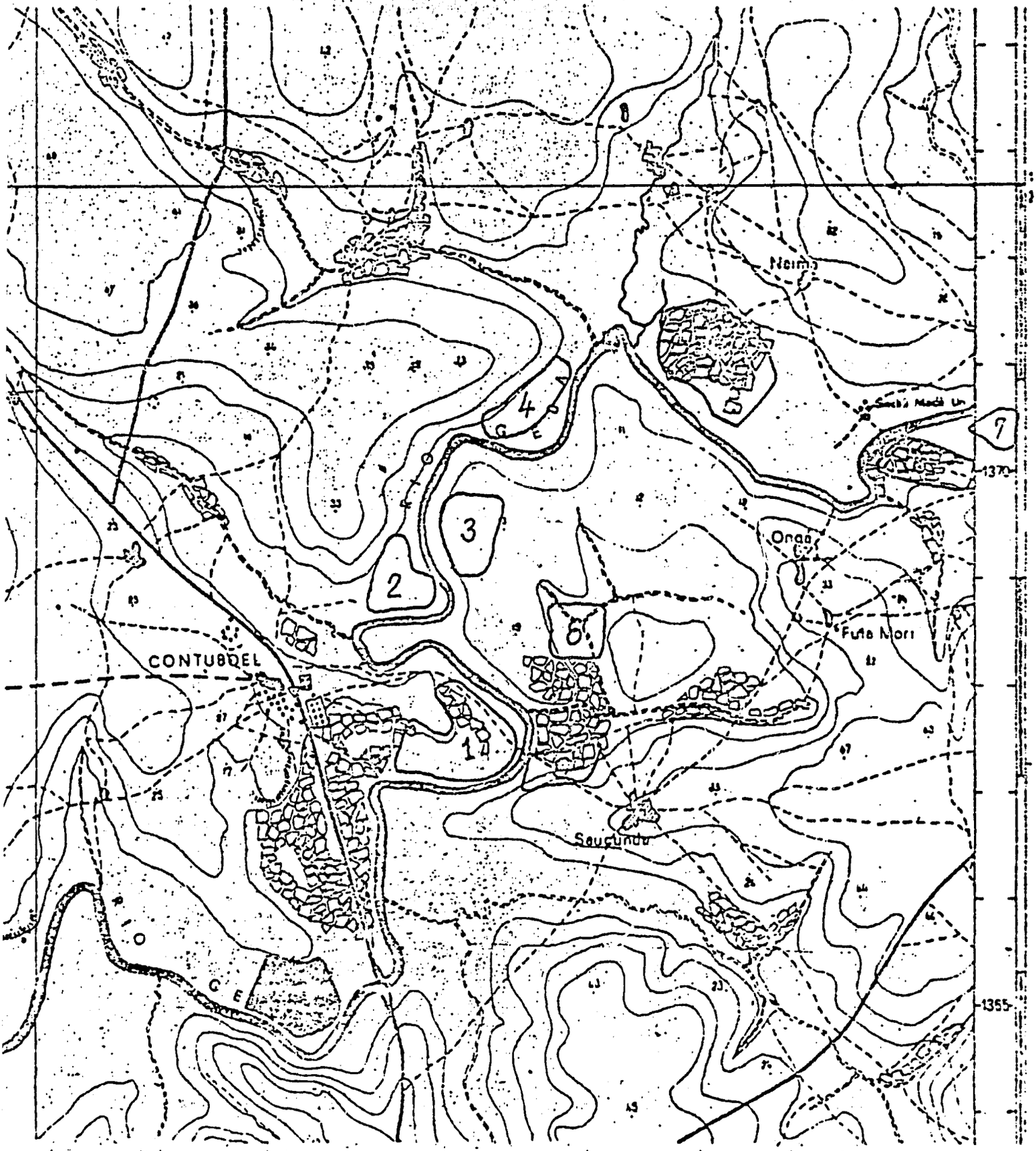

ZONA ESTUDADA
SONACO
CONTUBOEL
BAFATA
cacheu

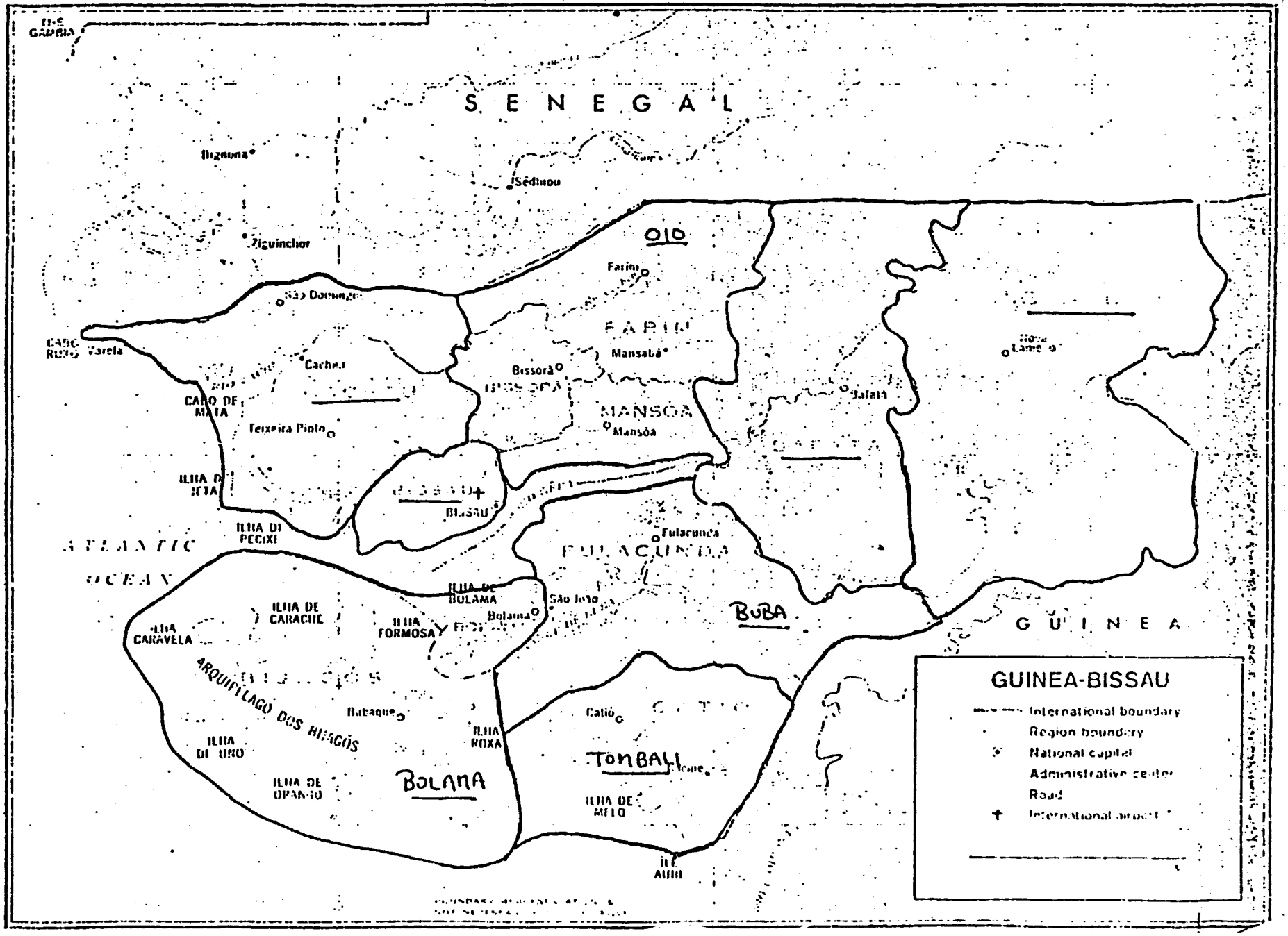
14° 59' W

Decresce cerca de 3' por ano
Determinação feita em Balatá em Março de 1955

Indice das folhas confinantes

colina do norte	tendinto	paunca
banjara	contubael	sonaco
bambadjaco	balatá	cennisá




SENEGAL
Bignona
Sédhiou
Ziguinchor
OIO
Farim
São Domingos
CANO RUIVO
Varela
Cacheu
Bissorã
Mansabá
CAIO DE MATA
Teixeira Pinto
MANSOA
Mansôa
Gabú
Bafatá
ILHA DE PECIXE
BISSAU
Fulacunda
FULACUNDA
ATLANTIC OCEAN
ILHA DE BOLAMA
São João
Bolama
BUBA
GUINEA
ILHA DE CARACHE
ILHA CARAVELA
ILHA FORMOSA
ARQUIPELAGO DOS BIJAGÓS
Bubaque
ILHA ROXA
ILHA DE URO
Catió
TONBALI
ILHA DE OPANGO
BOLAMA
ILHA DE MELO
GUINEA-BISSAU
International boundary
Region boundary
National capital
Administrative center
Road
International airport

APPENDIX A: NON RANDOM FARMER SAMPLE AT CONTUBOEL

CODE	FAMILY SIZE	ACTIVE MEMBERS	RATIO ACT. FAMILY SIZE	RATIO ACT. PARCEL SIZE	WET SEASON YIELD PER HA	DRY SEASON PARCEL SIZE	DRY SEASON YIELD PER HA
N. 1	8	4	0.5	0.6	670 Kg	0.6(?)	1330
N. 2	24	10	0.42	0.75	533	0.3	2000
N. 3	7	3	0.42	0.3	1000	0.15	2330
N. 4	20	4	0.2	0.3	1670	0.15	2670
N. 5	15	3	0.2	0.3	2670	0.3	4000
N. 6	18	-	-	0.3	—	0.18	5500
N. 7	9	6	0.67	-	—	0.10	5000
N. 8	-	-	-	0.3	2000	0.3	3330
N. 9	16	8	0.5	0.3	2833	0.3	5330
N. 10	-	-	-	0.3	1813	0.3	2670
N. 11	-	-	-	3.0	2670	1.5	5330
N. 12	9	5	0.55	0.3	2670	0.3	2000
N. 13	32	9	0.28	0.28	2330	0.28	7610
N. 14	10	3	0.33	0.3	3000	0.3	-
N. 15	18	9	0.5	0.3	4670	0.3	4445
AVERAGES	15.5	5.8	-	-	2194	-	3896

HYDROLOGIST'S RECOMMENDATIONS TO AID EVALUATION TEAM (Translated from French)

IRRIGATED PERIMETERS

The experimental irrigated rice perimeters at Contuboel and Saucunda involve micro-development of 58 and 25 hectares respectfully, fed by pumps from the Geba River. Peasant farmers have played an important part in establishing this project and is a good starting point for irrigated cultivation. It will greatly benefit the future development of intensive rice production.

(A) Soils

The soils are classified as peat (organic matter has been conserved in its original form). Drainage necessary for cultivation should be superficial. However, many of these peats are rich in sulfur which in the aerobic state - after drainage - oxydize into sulfuric acid and can result in excessive toxicity and acidity. Excessive drainage of this soil can also lead to irreversible packing of peat. Good drainage of the soil is achieved by using shallow canals equipped with means to control the water level (sluice gates "vanne" or overflow gates "deversoir a' poutrelle").

(B) Irrigation Systems

The irrigated perimeters were constructed for immediate use and consequently no master plan exist for their integration into larger perimeters. As a result, the irrigation systems are saturated. Any extension of the irrigated area is thus going to necessitate a redoing of the primary and secondary systems as well as the drainage system (this is inevitable in such a project where the low initial cost later involves modifications for further parcelling). At present, the use of a sill gage is being examined to measure the flow of water into each perimeter. Technicians will be able to determine the volume of water that is distributed per hectare during the dry season. In addition, data collected should enable technicians to: determine the amount of water used in each perimeter; calculate the cost of water per cubic meter; and evaluate the volume of water needed for project replication and expansion. Pump monitors who handle daily water distribution will be instructed by the area's agent for the Department of Hydrology; this agent will evaluate water requirements and organize the distribution of water. Better management of water resources will help avoid excess flow.

TOPOGRAPHY

Existing Data

Maps to the scale of 1/10,000 (an enlargement of that at 1/50,000) of the Contuboel region were completed in 1977. Two maps at 1/1,000 of the land retail the irrigated perimeters in this area which are located to the right and left side of the Bafata-Contuboel road on the right bank of the Geba River. These maps also detail on a grid, the irrigated perimeters. However, when these two maps are compared they do not conform together. Instead problems arise when drawing the principal canal for the perimeter on the left side of the Bafata-Contuboel road. To the right side of the road the configuration of the land is more heterogenous requiring a larger topographical survey in order to draw up an adequate canal system. The perimeters in Saucunda draw special attention; the layout of the land at first sight lends itself to the site of a dam. Ridged land could be used for the Saucunda perimeter and others downstream.

CONCLUSION

Fortunately the management personnel of the experimental rice production is aware of the need in any subsequent rice project to establish a master development plan and has now begun a pedological and topographical study of the areas that can be parcelled in the Geba Basin. It cannot be emphasized enough the necessity for making an evaluation this year of the water resources of the Geba River. This is the predominant factor in the extension of these projects and would involve a hydrological study. Also, provision should be made for:

(A) A plan relating to management and other support services, such as:

- (a) definition and role of management
- (b) relationship between the management organization and the farmers
- (c) financial aspects of management
- (d) costs to producers
- (e) a plan to study production

(B) Studies on the following subject:

- (a) water control and upkeep of the constructions
- (b) production systems
- (c) large-scale farming
- (d) collective and individual production equipment
- (e) mechanization

Obviously as far as possible management standards should apply to each particular case rather than be handled in an overall fashion. A master plan should outline for future parcelling the irrigated perimeters of ponds 20 m either side of the Geba River (from Bafata to Sonaco). It would also be worthwhile to carry out an aerial photographic survey to the scale of

1/1,000 which would facilitate the planning of the master plan and help establish various phases of the irrigated perimeters. IGN (France) are to do an aerial survey at 1/10,000 for 15 urban centers. It would be advantageous to include the above mentioned area in their work.

HYDROLOGICAL STUDY

1. Regulation of the water level of the Geba River
2. Reading of the flow
3. Estimate of the volume of water in the canals
4. Analyses of water samples

1. Regulation of the water level of the Geba River from Sonaco to Bafata

1.1 Installation of limnimetric stations

- Sonaco (already existing)
- Contuboel (to be installed)
- Badata (already existing)
- Costs for each pump station (to be installed)

1.2 Construction of piezometers in the area where there is the greatest concentration of pump stations

3 piezometer on the left bank
3 piezometers on the right bank

2. Hydrometical Measurements

2.1 Hydrometical windmill gages ("jaugegages au moulinet hydrométrique")

Sonaco station
Contuboel station
Bafata station

1.3 Measurements of the Water

1.3.1 At the limnimetric stations
Sonaco station
Contuboel station
Bafata station
Three times a day, morning, noon and evening
1.3.2 Pump station fees
Before and after each time they are started up

3. Estimate of the volume of water in the canals

3.1 Lengthwise profile

3.1.1. A boring with a "plumb-line" or a Sonaco prober at Contuboel (wooden bridge)

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3.1.2. The other Contuboel one at Bafata (bridge)

3.2 Crosswise profile

3.2.1. These would be in conjunction with the lengthwise profile

4. Water analysis

4.1 During the lengthwise profile, the water will be tested with a conductometer and PH meter.

4.2 A program could be set up according to the results

4.3. A physico-chemical analysis will take place every month during the low-water season, from January to April.

5.0 Equipment needed

1 - vehicle with driver
1 - Zodiac type boat with outboard motor
1 - apparatus for measuring complete water flow
1 - conductometer
1 - PH meter
1 - 5mm cable or equivalent cord
1 - 20 meter metal measuring tape
1 - four-man hydrometrist crew
1 - ultrasonic borer (sondeur)

This study should take place at the end of April at the lowest level of the river.

ENVIRONMENTAL THRESHOLD DECISION

Location: Guinea-Bissau, West Africa

Project Title: Rice Production, 657-0004

Funding: FY-80 - $550,00 Grant

USAID/Guinea-Bissau Recommendation:

Based on the Initial Environmental Examination, the USAID Guinea-Bissua Mission has concluded that subject project will not have any significant negative effect on the environment and therefore recommends a Negative Determination.

AA/AFR Decision:

Pursuant to the authority vested in the Assistant Administrator for Africa under Title 22, Part 216.4a, Environmental Procedures, and based upon the above recommendation, I hereby determine that the proposed project is not an action which will have ~~any~~ significant ~~negative~~ effect on the environment, and therefore is not an action for which an Environmental Impact Statement or an Environmental Assessment will be reqired.

Assistant Administrator for Africa

Date: _____

INITIAL ENVIRONMENTAL EXAMINATION (IEE)

Project Location: Guinea-Bissau, West Africa

Project Title: Rice Production

Funding: FY 1980 - U.S.$550,000 - Grant

IEE Prepared by:

Mr. Louis F. Macary, USAID/Bissau
Mr. Craig P. Buxton, USAID/Bissau
Mr. William Shimasaki, USAID/Bissau
Consultant (Engineer)

Date Prepared:

February 15, 1979

(In collaboration with Sr. Malam Sadjo, Chief Extensionist of the GOGB's Department of Rice Experimentation and Production at Contuboel).

Environment Action Recommended:

The USAID/Bissau project committee (participants listed above), in consultation with personnel of the GOGB's Department of Rice Experimentation and Production (DEPA), has undertaken a complete Initial Environmental Examination (IEE) of the environmental impact aspects of the proposed Rice Production project expansion and has arrived at a recommendation for a Negative Determination, as indicated in the Threshold Decision section of the IEE.

Concurrence:

I have reviewed the Initial Environmental Examination prepared for the Rice Production project expansion and concur in the recommendation for a Negative Determination.

James O'D Maher
Country Development Officer
USAID/Bissau

2/20/79
Date

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

a) Description of Project

Guinea-Bissau is essentially a rural based subsistence economy with agriculture providing a major source of employment and foreign exchange to the country. However, the combined impact of the anti-colonial war against the Portuguese and the economic hardship since independence has brought agricultural development, particularly the production of rice, to a dismal state. Investments in agriculture remain, however, Guinea-Bissau's best development alternative.

Peasant farmers who comprise nearly 85 per cent of Guinea-Bissau's population were once able to produce enough rice, a principal food crop, for local consumption and provide a small surplus to export. Recognizing the country's dependence and potential in rice production, the GOGB's immediate objective is to regain self-sufficiency and satisfy domestic consumption. In response to this priority, AID, in collaboration with FAO, is helping the GOGB introduce for the first time intensive dry season rice irrigation to peasant farmers.

The project encompasses two small perimeters at Contuboel and Saucunda, cultivated both in the wet and dry seasons, and a third perimeter at nearby Sonaco which is using intensive agriculture practices in the wet season. Dry season rice production will be introduced in 1979 to the latter site. All three sites are located either near Bafata or Gabu, the country's second and third largest cities respectively. In its embryonic stage the project was a U.S. Embassy supported self-help project.

In 1976 the GOGB with assistance from FAO, established in Contuboel the country's first center for rice experimentation and seed multiplication. Concurrently on small perimeters located across from the new Seed Multiplication Center, 12 families received assistance under U.S. self-help funds to level and prepare 6 hectares of land (.5 hectares each). A GOGB agronomist and agricultural extension agent from the Seed Multiplication Centers helped the farmers to collectively prepare and maintain the fields, dikes and canals. They also introduced the farmers to improved seeds, fertilizers and, when needed, the use of pesticides, and better farming practices.

As a result, yields for the first dry season harvest of rice varied from 2.5 to 6 tons per hectare. Previous yields in the wet seasons under traditional farming approached 600 kilos per hectare. Wet season yields under new farming methods approach an average of 2.5 tons per hectare.

Having witnessed the success of the first dry season harvest in May 1977, over 300 farmers applied to enter into the project for the following year. Further assistance was sought from the newly established USAID Country Development Office. An expanded project under the Accelerated Impact Program (AIP) was designed with the assistance of the FAO agronomist at the Seed Multiplication Center.

Approved August 31, 1977 for U.S.$275,000, the AID AIP design reiterated the Government's aim of increased food production for peasant farmers. By December 1978, the project could claim to have achieved its primary objective of introducing irrigated rice culture to 150 families. Using the same methods introduced during the dry season, during the 1978 rainy season, 508 families cultivated 166 hectares, or an average of .33 hectares per family. Based on a non-random sample of 13 interviews with peasants at Contuboel, the average yield was 2,194 kilos per hectare. In the dry season 1978, 195 families cultivated 80 hectares with an average of .41 hectares per family. The sample of 14 families indicated an average yield of 3,896 kilos per hectare. Overall per capita rice output may have increased by five or six times as a result of the project. In addition, the project has provided an equal opportunity to all peasant farmers in the three communities involved. The distribution of land among the inscribed families has been relatively egalitarian, too.

Project inputs financed by AID include the construction of a warehouse, a garage and mechanic's shop, the provision of four three-cylinder engines with pumps, plows, pedal operated threshers, oxen and wooden yokes. To support the expanded activities of the project, the GOGB has increased the number of technicians and agricultural extension agents assigned to DEPA at the Seed Multiplication Center. FAO is continuing to provide the full-time assistance of an agronomist. Five small two-cylinder French pumps and motors were made available by the Dutch government.

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USAID/Bissau proposes under the expanded project to continue and improve upon the success of the existing pilot project. Project activities will be expanded to incorporate additional land adjacent to present project sites along the Geba River and one other site to be determined during the design of the Project Paper. Emphasis will be placed on small groups of families organized under production associations (about 25 hectares/50 families per association). A main objective will be to have these associationstake full responsibility of project inputs by the third year (FY 82).

b) Identification and Evaluation of Environmental Impacts

(See attached Impact Identification and Evaluation Form)

The project primarily entails the transfer of relatively simple irrigation methodology to expand and improve the utilization of dry season rice cultivation among Guinea-Bissau's peasant farmers. Project "construction" will be limited essentially to small irrigation works primarily in the Contuboel rice production area. (Any other areas of the country that might be incorporated under the project will be studied beforehand for an assessment of impacts on the local environment.)

The impact of the project on land use will be favorable with no foreseeable negative effects. There will be no major land clearing involved at Contuboel, as much of the same land that will be irrigated under the expanded project for the production of dry season rice is, or has been, utilized already for production of wet season rice. Land leveling, where determined to be needed, while altering the present natural land configuration, will actually improve on existing production/drainage/and water use conditions. There will be no change per se in the soil characteristics in the area of the project. As no virgin land is being cleared, no erosion problems will be introduced as a result of the project. As the land is primarily agricultural land, specifically suited to rice production, it will be used to best advantage, especially in view of the chronic shortage of rice in Guinea-Bissau. However, if and when there is no longer a shortage of rice in the country, it may become more lucrative to grow higher income products. The implementation of this project will have a positive impact on making any such transition possible, if desired.

There will be no negative impact resulting from the use of water from the Geba River. Only a very small percentage of the total flow of the Geba River will be utilized in the irrigation of dry season rice cultivation. All water not lost to evapo-transpiration will be returned to the river through infiltration.

The mineral content of the water, the method of application and its usage preclude the possibility of harmful effects of salinization of the soil due to the implementation of the project.

There will be very minor, if any, biological change in the water due to stagnant standing water or animal wastes (from oxen used to plow) in the water.

Malathion is the pesticide used to date at the Contuboel pilot project site. It was first introduced about one year ago to counterattack an outbreak of stem borer at Contuboel. A portion of last season's wet rice crop was destroyed by the disease before it was brought under control with the application of Malathion. This pesticide was provided by FAO and the FAO resident technician at the FAO Contuboel Seed Multiplication facility instructed and monitored the GOGB/DEPA extensionists in its proper usage. Had the pesticide not been used, the entire crop would likely have been lost. The disease seems to have been brought completely under control and there were no signs of stem borer in the subsequent dry season rice crop for which no pesticide was used.

It should be noted that under the pilot project no AID funds were provided for pesticides. Moreover, no pesticide is used unless there are definite indications of disease. Based on experience to date, the pesticide used for control of disease is not of significant volume in relation to the total water being used to create any environmental problems. Its application was carefully controlled by capable technicians of the GOGB's Department of Rice Experimentation and Production (DEPA) working full-time at the project sites, and under the supervision of the resident FAO specialist. Under these circumstances, the benefit of such utilization of pesticide far outweighed any possible risks on the environment.

It is not possible to forecast pesticide requirements at this time and there will be no provision per se under the expanded project for pesticide procurement or use. If it is to be used at all, pesticide would be employed by the GOGB on an as-needed basis, under circumstances similar to that described above.

Barge traffic is available to Bafata about 12 kilometers down river of the Contuboel area. However, since the river is subject to tidal effects up to and above Bafata, the flow of the river above Bafata is not a significant factor. The percentage of the total flow of the river expected to be used for the irrigation of dry season rice cultivation is insignificant. However, before larger scale projects of upwards of say 5,000 hectares are undertaken, the factor of the sufficiency of water should be more closely studied.

There will be no detrimental change or alteration in the cultural patterns of the ethnic groups in the project area, as essentially the same ethnic groups cultivating the rice lands during the wet season will be producing rice during the dry season. There will be no changes in population movement or resettlement due to implementation of the project. Land will be aportioned to the participating peasant farmers by DEPA according to existing familial breakdowns with complete respect for cultural values of the various participating tribal peoples. As rice is already the primary staple in the diet of the Guineenses, especially among the rural poor, dietary traditions will not be affected.

The impact of the project on health benefits should be very positive, albeit indirect. Increased availability of domestic staple food production should substantially improve the level of nutrition of the poor peasant farmer families participating in the project and to the poor of Guinea-Bissau in general as surpluses become available for marketing. (Evaluation of the Mission's pilot project in Contuboel to date indicate upwards of a four-fold increase in the per capita consumption of rice by participating families.)

There are no matters that are apparent or envisioned as becoming controversial in the near future as a result of the project. It is possible that with the experience and knowledge gained under this project, larger

dry season rice production projects would be undertaken. There is also the likelihood that, if and when dry season rice production is further expanded, it could lead to self-sufficiency of rice in Guinea-Bissau, or even for the country to become a rice exporting nation.

II. Recommendation for Environmental Action

The nature and scope of the Rice Production project expansion has been carefully considered with respect to the criteria contained in the Impact Identification and Evaluation Form (attached) with the conclusion that the project will have favorable impacts on the state of nutrition of the inhabitants of Guinea-Bissau, as well as the state of water-utilization and productivity of the soil, with no foreseeable negative repercussions on the overall environment.

Threshold Decision: For the reasons cited above, the USAID/Guinea-Bissau Mission project committee believes that no further environmental study is necessary and, therefore, recommends a Negative Determination.

Attachment

IEE FOR RICE PRODUCTION

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas	Impact Identification and Evaluation 1/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population------	N
b. Extracting natural resources---	N
c. Land clearing----------	L
d. Changing soil productivity capacity----------	M
2. Altering natural defenses---------	L
3. Foreclosing important uses--------	N
4. Jeopardizing man or his works-----	N

1/ Indication of impact:
- N - No environmental impact
- L - Little environmental impact
- M - Moderate environmental impact
- H - High environmental impact
- U - Unknown environmental impact

B. WATER QUALITY	
1. Physical state of water----------	L
2. Chemical and biological states-----	L
3. Ecological balance----------	N
C. ATMOSPHERIC	
1. Air additives----------	N
2. Air pollution----------	N
3. Noise pollution----------	N
D. NATURAL RESOURCES	
1. Diversion, altered use of water----	L
2. Irreversible, inefficient commitments----------	N
E. CULTURAL AND SOCIOECONOMIC	
1. Altering physical symbols----------	N
2. Changes of cultural traditions-----	N
3. Changes in population----------	N
F. HEALTH	
1. Changing a natural environment----	L
2. Eliminating an ecosystem----------	N
G. GENERAL	
1. International impacts----------	N
2. Controversial impacts----------	N
*3. Larger program impacts----------	U

* It is possible that with the experience and knowledge gained under the project, larger dry-season rice land projects would be undertaken. However, before larger scale projects of upwards of 5,000 hectares are undertaken, further study should be undertaken of the sufficiency of water from the irrigating river (Geba River).

H. OTHER POSSIBLE IMPACTS (not listed above)

None