

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D C 20523

BIBLIOGRAPHIC INPUT SHEET

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Batch 93

1. SUBJECT CLASSIFICATION	A. PRIMARY Food production and nutrition	AP12-000-G118
	B. SECONDARY Drainage and irrigation--Chad	

2. TITLE AND SUBTITLE
Chad, Sategui-Deressia irrigation project

3. AUTHOR(S)
Sargent, Merritt

4. DOCUMENT DATE 1973	5. NUMBER OF PAGES 29p.	6. ARC NUMBER ARC
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
Sargent

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)

9. ABSTRACT

10. CONTROL NUMBER <i>PN-AA6-118</i>	11. PRICE OF DOCUMENT
12. DESCRIPTORS AID Chad Deressia Financing Project design	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/CM/afr-C-73-30
	15. TYPE OF DOCUMENT

_ AP12-007

AID/CM/afr-C-73-30
Sergeant PN-AAG-118

Contract Number: AID/CM/afr-C-73-30

CHAD

SATEGUI-DERESSIA IRRIGATION PROJECT

AUGUST, 1973

MERRITT SARGENT

MISSION: June 29, 1973 to August 12, 1973 to Examine Possibilities
for US/AID Participation

TABLE OF CONTENTS

- I. Summary of Trip and its Purposes
- II. Introduction
- III. Issues of Concern
 - III.1. Personnel
 - III.2. Agriculture
 - III.3. Credit
 - III.4. Processing and Marketing
 - III.5. Possible Negative Side Effects
 - III.6. Hydrology
 - III.7. Project Calendar
 - III.8. Total Costs
 - III.9. Projet du Developpement de la Vallee de l'Oueme
- IV. Recommendations for US/AID Financing
 - IV.1. Perspective
 - IV.2. Nature
 - IV.3. Cost
- V. Conclusion

On July 3, 1973, after four days of consultation in Washington, I left for Fort Lamy via Cotonou, Dahomey and Yaounde, Cameroons. I wished to spend two days in Cotonou in order to gather information concerning a rice scheme in the south of Dahomey which bears a remarkable similarity to the Sategui-Deressia Project. In Yaounde, I visited US/AID's regional office for consultations. I arrived in Fort Lamy on July 15, 1973 and spent the following week in meetings with the American Embassy, the Ministry of Territorial Management, the Director of the Plan, the Director of Agriculture, and the Director of the National Office of Rural Development. On July 22, 1973 I flew down to the project area for visits to the Pilot Farm in Buomo, to the villages involved in the project and with the various administrative and agricultural officials who are directly concerned with the project area. After two weeks, I returned to Fort Lamy on August 5, 1973 and revisited the people I had seen previously. I also spent some time with people at the Chad Development Bank and at the UNDP/EF (Project: RESEARCH INTO THE CONTROL OF GRAIN EATING BIRDS (QUELEA QUELEA)).

On August 12, 1973 I left Fort Lamy to return to Washington and prepare my report.

CHAD SATEGUI - DERESSIA IRRIGATION PROJECT

I. Summary of Trip and its Purposes:

The International Bank for Reconstruction and Development (IBRD) has proposed a rice irrigation project on the Sategui-Deressia plain in the Logone River valley in Southern Chad. The project proposes to build a system of canals and dikes which would permit improved control of the annual flooding in the project area. With improved water control it would be possible to introduce new varieties and improved agricultural techniques and thus increase per hectare yields. The project would concern itself with all aspects of a rice operation: seed research and multiplication; introduction of improved agricultural techniques and modern production inputs; processing and marketing of production. IBRD has requested US/AID to contribute as much as 3,000,000 \$USA and it is to this end that I was contracted to visit the project area.

As an agricultural economist I was requested to examine the project area and present agricultural practices to the changes proposed by IBRD's project. If I found that some of the underlying assumptions in the project proposal were unrealistic in light of existing conditions in Chad and the project area, I was to recommend needed changes in the plan to improve the chances for success.

II. Introduction

The basic ingredients for a sound rice project certainly exist in the project area. The farmers in the area have been rice growers for the last thirty years. The land is relatively decent rice land, and when the rainy seasons in Sub-saharan Africa return to normal there is plenty of water. Approximately eighty per cent of the rice land is prepared with the help of animal drawn plows, either owner-operated or rented. The farmers, over the years, have acquired a somewhat surprising knowledge of rice. They distinguish quite accurately between the various time and water needs of different rice varieties and choose their variety according to the characteristics of their particular piece of land.

As the IBRD's proposal indicates, the primary obstacle to improved rice growing in the area is the inability to control the natural flood conditions in the growing season. The inability to control their water resources causes a series of problems to the rice farmer and until they are solved it is not reasonable to suggest changes in varieties and growing techniques. In the project area the flooding tends to occur 15 to 20 days later than

it ought to in ideal conditions; the water level standing on the rice field is entirely dependent on daily fluctuations in rainfall and in the overflow from the Lozong River; at times the flooding is so great and so violent as to wash out the fields; and finally it is not possible for the farmer to control when his field is to be drained. The proposed dike and canal work would alleviate this obstacle

Given that the water resources can be controlled, it is then necessary to determine how the rice is to be grown. It is my opinion that the success of the project will depend primarily on the project authority's ability to determine what techniques to employ and to deliver managerial, logistical and extension support to the farmers. In this paper I intend to examine a series of issues which I feel are crucial to the success of the project. In some cases I can only suggest the need for further investigation, while in others I argue the need for substantive changes in approach.

III. Issues of Concern

III.1. The project authority should have qualified and effective personnel, and, for the success of the project, particularly at the village level. According to the project proposal there are to be 30 *encadreurs de village*

(village level extension agents) and 6 moniteurs de l'agriculture (encadreurs' supervisors). If the quantity and quality improvements in rice production are to be reached, the ability of these local level agents to instruct farmers in the new agricultural practices and provide dependable advice and logistical support is of primary importance. The Government of Chad (GOC) does not have the financial or institutional resources to provide such staffing, especially for a rice farming area. The most important institutions in existence today are at Ba-Illi and at Tikem. The school in Ba-Illi trains conducteurs de l'agriculture (2 years) and moniteurs de l'agriculture (3 years). The training programs consist primarily of theoretical studies with very little exposure to the more practical aspects of farming in Chad. The study of rice farming in Chad is practically non-existent.

Practical
Training

The Minister of Territorial Management, who will have the ultimate responsibility for the project within the GOC, wants to recruit entirely new staff who have certificats d'etudes (roughly equivalent to a primary school education), who originate from the Logone River valley and train them specifically for the project. It is his opinion that if he were to detach agents from other governmental services for

a given number of years, these individuals would know that their old positions would be waiting for them and would therefore not be concerned with the quality of their work. However, by hiring new people trained especially for the project, he feels that quality work could be better guaranteed. The Director of the Plan feels that the existing institutions can be used for this purpose. With the construction of demonstration fields at each of the institutions, he feels that satisfactory training can be provided.

As far as the IBRD's proposal is concerned, the only training component provided for in the project is a number of expatriate technicians who will be training their Chadian counterparts for the various directorship positions in the project authority. Not only do I think that this is insufficient but also that a very real opportunity is being overlooked.

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The agricultural station at Buomo will be an important component to the project just doing seed research and multiplication. However, I would suggest that the ideal place to train personnel for the project authority is also at the agricultural station. The station has rights to more than

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350 hectares. The IBRD has suggested 200 ha. for experimentation and seed multiplication. These 200 ha. would be double-cropped and mechanized. The station has an impressive physical plant, and a herd of 60 cattle for manure production. Given that the station is in the project area, trainees would have the opportunity to grow rice under the same conditions as the farmers they will be teaching. It is easily possible to use another 50 hectares at the station and with some of the working oxen in the station's herd use the land as a training field. It would also seem that pilot farmers might be brought in for a few months at a time to learn new techniques which they can take back to their neighbors. Finally, it would be then possible to offer the personnel a regular series of refresher courses. On-site training and continuing education at the agricultural station in Buomo seems the most practical solution to the problem of assuring qualified and effective staffing.

III.2. The most disturbing thing about the agricultural questions inherent in the project is that they will be answered after the project has begun. It is of special importance that this project have a productive first step. The project intends to move into an area already farmed

for rice, tear up the land then tell the farmers to return to their land. This is all on the assumption, at least on the farmers' part that what has been done to his land will help him to grow more rice. Yet in the IBRD's proposal and even in the Carlo Lotfi/FAO feasibility study the questions of seed varieties, fertilizers, herbicides, spacing, contour bunding, and farming equipment are unresolved and will not be so until after the farmers are already participating in the project. In the first years of the project, if the only change in rice growing techniques is improved water control, the increased yields will be marginal and the farmers will quite naturally be skeptical of the project's worth. This will bring about a phenomenon common to many development programs in West and Central Africa, that of trying to catch up to promises made.

The problem of rice varieties is a difficult one. It is not so much a problem of determining which varieties to use but rather of having available sufficient quantities of pure strains. At present there are four varieties being used in the area and have been for some time; Bentoubala B, D 52/37, Phong Ngeon, and Maroua. Their different time and water needs are well adapted to the

variations in land and water on the Sategui-Deressia plain. However, they have been used for some time and the strains can no longer be considered pure, often mixed with each other and wild varieties. Furthermore, the pilot farm which has been in financial distress for the past six years has been unable to produce even a fraction of the seed demanded. This was perhaps the most tragic impact of the current drought in the area. The agricultural services were supplying only 20 kilograms/hectare of seed and then only for perhaps 20 percent of the farmers. It would seem very important that the project from the first year be able to at least supply pure strains of varieties currently in use or of varieties whose suitability to the area is relatively certain. My suggestions would be Gambiaka, Santane Dialor and/or IR 22. I would add one final question concerning seed varieties. In the Carlo Rottli/Fao feasibility study, it is advised that the varieties used be changed each year on 50 percent of the project area. This seems to me a very rapid turnover and nowhere in the project documents can I find a justification for such a policy. This point seems to warrant further study as it is my impression that the regressive tendencies of rice varieties are not that fast.

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OK this out

While in the project area I attempted to calculate labor requirements per hectare under both traditional and improved conditions. Animal power was used only for land preparation. Under traditional planting conditions the average number of pockets per hectare is 50,000 while improved planting would call for 125,000 (20cm x 40cm). As for contour bunding, it is difficult to get an accurate figure. For bunds 50cm high and 100cm wide at their base it is assumed that a man with hand hoe can build a 100 meter bund in seven days and that the average requirements per hectare will be 200 meters per hectare. Finally the average agricultural worker in the area farms 1.5 hectares of rice.

MAN/DAY REQUIREMENTS PER HECTARE

<u>Operation</u>	<u>Traditional</u>	<u>Improved</u>
Preparation (2 men x 3 days)	6	6
Planting	6	14
First Weeding	20	20
Fertilizing (100kg)	-	6
Second Weeding	15	15
Harvest	20	20
Contour Bunding (200m)	-	14
<hr/>		
1 Hectare	67 man/days	95 man/days
<hr/>		
1.5 Hectares	100 man/days	142 man/days
<hr/>		

It is obvious why the average area per farmer is 1.5 hectares. As the rice varieties require from 90 to 120 day cycles, he has found his optimum area given the techniques with which he works. However, when the new agricultural practices are added in, the farmer with his present technology, does not have enough days available to perform the necessary operations. The obvious answer is improved animal power techniques.

Animal power was introduced in the cotton zones of Chad over 15 years ago. In the Sategui-Deressia area, there is no opportunity to buy new equipment, spare parts or have repair work done. The farmers are known to travel 200 kilometers to buy a plow. The only technique introduced was plowing. It is relatively easy to double or triple the amount of land plowed, but then the real bottleneck is weeding. By combining fertilizer spreading with the first weeding, the total weeding time can be reduced from 41 days to at most 10 man-days. There are also animal mechanized techniques available for planting and harvesting. The point I am trying to make is that if the project expects farmers to continue farming their average areas and adopt improved techniques, the only way it will be possible to attain the projected quantity

and quality increases is through the intergration of a complete animal power scheme into the project with provisions for sound technical advice and dependable logistical support. It will be necessary to train the extension personnel in animal power techniques; the farmers will have to be taught also; local blacksmiths and carpenters should be trained to do repair work and fabricate many of the needed spare parts at the village level; and health care and feeding practices ought to be improved.

It is my feeling that the most logical place for this component is again at the agricultural station in Buomo. An animal traction center at the station would be best capable of providing the technical advice, training and logistical support necessary.

Concur

III.3 The project requests farmers to increase the amount of production inputs necessary to rice growing. They will need to buy high-yielding varieties, fertilizers, possibly seed treatments, pesticides or herbicides, and if the animal power component is broadened and improved, agricultural equipment. Consequently the question of short-term agricultural credit is a very important one. The benefits derived from the project will depend greatly on the farmers' ability to obtain short-term credit.

According to IBRD's proposal, the GOC's participation will consist, in part, of providing funds for agricultural credit and paddy purchases (560,000 \$USA). In fact, what this means is that the GOC will guarantee a loan from the Chad Development Bank (CDB) to the project. In effect, the GOC promises to reimburse the CDB for all non-payments. The CDB generally requires 10 per cent of the total loan as a guarantee.

In talks with the Director of the CDB and his assistant in charge of agricultural credit, I learned that agricultural credit in Chad is administered by the National Office for Rural Development, that if there is more than 10 per cent non-payment in a village, credit can be extended only to the village as a whole and no longer to individuals, and that non-payment is running between 15 and 20 per cent. Furthermore the Director of the CDB was quite frank in admitting that the GOC was incapable of paying the guarantee, and suggests that if the GOC tenders the guaranty for the project's agricultural credit, there will be constant difficulties.

As far as the purchases of paddy are concerned this poses less of a problem. The CDB will advance money to purchase the farmers' production; the project will process the rice,

market it and repay the CDB. Agricultural credit for production inputs is a different problem. For most inputs, farmers need 6 to 8 month credit and in the case of animal power equipment perhaps 3 to 4 years. As there are no village or marketing cooperatives, they will need it on an individual basis. It would be a safe estimation that the project authority, through its close relationship to the farmers in the project, can obtain a significantly lower percentage of non-payment than other organizations. However it must have a dependable source of funds. So much of the success of the project depends on the farmers' access to production inputs that it might be more intelligent to have the project authority, itself, guarantee the CDB's loan rather than the GOC. It is my opinion that the GOC cannot be expected to contribute anything more than a token support, and that ~~this~~ support should not be in as important and sensitive area as agricultural credit.

III.4. The rice processing and marketing phases of the project seem to be based on some assumptions which to the best of my knowledge are unfounded. The IBRD's proposal argues that the traditional method of milling rice (mortar and pestle) cannot be expanded as the women cannot afford to devote more time to milling and that the only mechanized

milling operations in the area are governmental. There are at least 7 or 8 small rice hullers in the town of Lai which are privately owned. Far more impressive is the town of Goular. This town is in the project area. A number of war veterans taking advantage of their pensions have organized a processing cooperative of sorts, purchased a small rice huller and do custom hulling in the village. It seems logical that if the project significantly increases the rice tonnage in the area, private individuals will find the prospects of setting up a hulling operation quite attractive. I know that in Nigeria a small, relatively inexpensive rice huller (Englebert) is available and would assume something similar might be available in the Cameroons. It is somewhat difficult to determine what the effects of substantial private enterprise would be on the project authority's milling operation. Obviously, it is to the farmer's advantage to have his rice hulled by a custom operator even if the charges were as much 10 CFA/kilo since the farmer would get the remaining value-added whereas if he sells to the project authority he receives only the paddy price. However, if the farmer chooses to process his own rice, he must have markets opportunities readily available. The local markets do not have a significant demand for rice simply because the vast

majority of the people in the area grow their own rice. The cost and difficulties of transporting the hulled rice to market centers such as Moundou, Fort Lamy and even into the Cameroons may in fact not be worth the effort. I wish only to point out that there are opportunities for rice processing outside the project, but that the marketing difficulties may offset the advantages of custom processing.

The marketing of paddy seems also to be based on some unfounded assumptions. The estimates of paddy sold to private speculators vary from 15 to 25 per cent of the farmer's production with an average of 55 per cent held for family consumption. The farmer generally receives a better price from private buyers headed for the north of Chad or the Cameroons. Last year's price in Chad with the government marketing board was 14 CFA/kilo while across the border in Cameroons the price was 18 CFA/kilo. Even if we use a generous estimate of the percentage bought by the government, say 30% of production, by the end of the first stage, 1982, the tonnage bought by the project authority would be only slightly over 6,000 tons (30% of 20,000 tons). If, as was calculated by the Carlo Lotti/FAO study the new rice factory operates 16 hours per day, this would provide only 3½ months of work. The question then is will the rice factory process rice grown outside of the project area and if so will it be

on a custom basis or will the project authority market this rice also? Finally, if rice is bought from outside the project area, how can the varieties and quality be controlled?

The processing and marketing component of the project also includes a threshing operation. In order to keep the rice clean, maintain high quality and remove the rice from the stalks before it becomes too dry, a threshing operation is certainly necessary. It has been proposed to build 8 store rooms scattered around the project area and supply them each with 2.5 ton/hour motorized threshers. Consequently, the farmers will be obliged to carry their paddy, still on its stalk, to the storeroom area. Not only is this very hard work but unnecessary. There exist small pedal-operated threshers either in Japan or China and even in some African countries that are very efficient, can be built and repaired locally, and can fit into an ox-cart for transport from field-to-field. This would assure clean rice, and yet is much better adapted to the local conditions.

One final aspect of processing and marketing which neither the Carlo Lotli/FAO study or the IRRD proposal discuss is the use of rice by-products. In the area, rice straw is

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given to cattle and the rice hulls are mixed with mud in the making of bricks to add strength to the brick. Rice bran is generally unused except by scavenging fowl.

The government marketing board which processes rice in the area now does have a number of clients who purchase rice bran each year at 7 CFA/kilo. Some of these clients, mostly poultry concerns, wish to monopolize the projects production of rice bran. I would like to suggest that some sort of system be set up whereby the farmers involved in the project have access to this rice bran as a protein supplement for their working animals. The cattle have a particular need during the dry season, when the factory will be producing, for protein supplements to their diet because as soon as the rains come the most taxing work season, plowing, begins.

III.5. There are several peripheral issues which were not discussed either by IBRD or the Carlo/FAO study. I am not able to offer any concrete suggestions, but I would like to ask for further investigation. The first problem is that of grain eating birds. I have never known of a rice project that did not have part of its crop consumed by birds.

There is a UNDP project in Chad which is investigating possible methods of control, and their work is primarily in the area around Lake Chad. The only information I could gather is that all the rice farmers I spoke to complained of

bird damage and that the north-south migration routes of these birds carry them right over the area. This would seem to pose the most danger to the dry season crop as it would be ready to harvest just about the time the birds reach the Sate,ui-Peressia area on their way south. However, what is called for, and the people at the UNDP project are more than willing to help out, is further study of the habits and migration cycles of these birds. Given that the internal rate of return on the project is calculated at only 11%, then a 10 to 15% loss to bird damage would have a major effect on the project as a whole.

A second question is the potential effects of the water control on the local fishing industry. When the river overflows fish swim out onto the flood plain. At the end of the rainy season, as the waters recede back into the river, the small fluctuations in the land catch small pools of water full of fish. The farmers very easily harvest them. As the project improves water control and field management, these natural pools will disappear. Furthermore, along the river bank each family has dug out a small ditch which, when the waters are receding, they fish by strapping a net across. The main intake canal will certainly effect this traditional method of fishing. I am not able to estimate

the degree to which the project will effect the local fishing industry, but as fish are the primary source of protein in the area, I believe some further attention should be paid to this potential problem.

Thirdly, the health factor should receive some attention. Statistical data on health problems in the area is very sketchy and not very dependable. The health hazard particular to rice projects is schistosomiasis (bilharzia). The little information which does exist indicates the highest percentage of diagnosed cases occurs in the peak of the dry season. This is quite understandable as the only water available at this time is stagnant and people are forced to use it. It is common in rice projects to observe an increase in the incidence of schistosomiasis. Because of improved water control, water stands on the fields longer and more quietly. Because of more intensive agricultural practices, the farmer is forced to spend more time standing in the water. It follows that there will be more sickness. Preventative measures available are few and impractical.

III.6. The rainy seasons in Chad have not been normal since 1970 when the Carlo Lotti/FAO study was done. In

All problems

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1972 the Logone did not overflow its banks. As of July 31, 1973 the depth of the Logone at Iai was running almost a meter below the same date in 1970, the last good year. Both the IBRD proposal and the Carlo Lotti/FAO study calculated the average flows and depths on the basis that 1 in 5 years would be a bad year. I would like to point out that this is simply another way of saying that each year there is a 20% chance of it being a bad year. My knowledge of hydrology is minimal, but I do realize how difficult it is to make dependable predictions concerning rainfall, especially given recent history in the Sahelian Zone. I only wish to suggest that the recent three years do not seem to be representative of the meteorological data upon which the original feasibility study was based.

III.7. The IBRD's project proposal calls for a six year calendar as the initial phase of the project. The final design is to be completed by June, 1974. In the dry season beginning in November, 1974 and for the next 6 months, construction of 11 living units, the intake works, the first polder of 1,750 ha., 24 kilometers of feeder roads, and the rejuvenation of the agricultural station including the earth work on 200 ha. will all be completed. Referring back to my earlier statements concerning the problems of training the project's personnel and providing sufficient

quantities of seed to the farmers, if in the first active year of the project, both the agricultural station and the farmers on 1,750 ha. begin working simultaneously, it will be impossible to provide either dependable extension services or sufficient quantities of rice seed (first year needs are approximately 20 tons). Consequently the first year experience will be at best mediocre and probably quite poor. This will create a situation within the project of continuously trying to regain lost ground. I also find it very difficult to imagine a construction company accomplishing all these works in such a short time, especially in such an isolated area as the bush of Chad. I suggest that in the first year all the construction works except the first polder of 1,750 ha. should be finished. This would not only be a more practical schedule for the construction firm, but also would allow the agricultural station the opportunity to train its personnel, set up its logistic support systems, and propagate the necessary rice seed before the farmers begin working within the project.

III.8. In glancing over some of the total project calculations both in the IBRD's proposal and the Carlo Lotti/FAO study, I was struck by some incongruencies. I have been unable to explain them and consequently will simply point them out.

	<u>Carlo Lotti/FAO</u>	<u>IBRD</u>
First Phase:	6,000 hectares	4,000 hectares
Dollar Cost:	6.2 million \$USA	9.7 million \$USA
Original Exchange:	@275 CFA - 1.00\$USA	@230.2 CFA - 1.00\$USA
CFA Cost:	1.7 billion CFA	2.2 billion CFA
Current Exchange:	@200 CFA = 1.00\$USA	@200 CFA 1.00\$USA
CFA Cost:	1.24 billion CFA	1.94 billion CFA
Internal Rate of Return:	11%	11%
Estimated Average Yields:	2.4 tons/ha.	2.4 tons/ha.

How?

My question is obviously how both studies calculated the same internal rate of return. I realize that the IBRD's proposal assumes that there will be some sort of a demonstration effect on 7,000 ha. surrounding the project area.

Little justification for this belief is given and it seems a very risky assumption unless a concerted effort on the part of the project is made to bring about such an effect.

III.9. My short trip to Dahomey was for the purpose of visiting a rice project in that country which is remarkably similar to the proposed project in Chad. The usefulness of this visit was primarily to give me some idea where potential areas of difficulty might occur in the Chad project.

The "Projet pour le Developpement de la Vallee de l'Oueme" began six years ago. Its first phase was 3,000 ha. on one side of the river. The Oueme valley is a flood plain very similar to the Logone valley and is naturally flooded each year. At the end of the first phase (6 years), 1,200 ha. had been prepared and only 400 ha. were in cultivation. Traditional fishing habits were severely disrupted and the annual fish harvest greatly reduced. There was also a significant increase in the incidence of shistosomiasis. At the end of the first phase, the Dahomean project authority was to take full responsibility for the project and when it did, the project went bankrupt. Financing for the second phase of 20,000 ha. on the other side of the river has been obtained. The impact of this trip on my thinking can be easily seen in Sub-Sections III 1., III.3., and III.5.

IV. Recommendations for US/AID Financing:

IV.1. As the IBRD's draft proposal admits, the project must be considered to have a high risk factor. In examining the project design and the project area, my objective was to locate what seem to be serious risks within the project design. Having isolated such weaknesses, I have then

attempted to design a possible intervention for US/AID funds which would be most effective in minimizing these risks.

IV.2. Sub-Sections III.1., III.2., and III.3. seem to lend themselves to one common opportunity for US/AID. Agricultural research, seed propagation, a more thorough animal power system, credit opportunities and logistical support could all be centered at an expanded agricultural station within the project. The success of the project will depend entirely on the farmers' ability to grow rice with improved seed, new production inputs, improved tools and new farming techniques. To do this he will need sound technical advice, dependable logistic support and access to short-term credit financing. The deliverance of these services could be better assured through an expanded agricultural station at Buomo.

IV.3. Total costs in the present IBRD project proposal for the agricultural station are in the neighborhood of 500,000 \$USA. If the station were to be expanded in terms of the functions I have suggested, it would probably be necessary to enlarge somewhat the physical plant at Buomo. There would be a need for living units for the trainees, facilities to set up the animal traction center, and undoubtedly

some miscellaneous expenses. As far as managerial resources are concerned, either the extension personnel already provided for in the project could accept the responsibilities at the training center or if this is too large a workload, an additional extension expert could be employed. It is difficult to estimate these expenses, but if it were necessary to employ an additional extension specialist, the added cost to the expanded agricultural station could reach 350,000\$USA. Finally, if the project were to allocate funds to provide its own guarantee to the Chad Development Bank for the necessary credit opportunities, the revolving fund, including an additional component for animal traction equipment beyond the needs for production inputs and paddy purchases, could reach 100,000\$USA. Thus, in very round figures, a US/AID intervention of the kind I have suggested would cost approximately 1,000,000\$USA.

V. Conclusion

As I stated in my introduction, the basic ingredients for a sound rice project in the Sategui-Deressia area certainly exist. The success of such a large project as the one proposed will depend on the project authority's ability to deliver the production inputs, technical advice and extension services to

the farmers. I have interpreted my role primarily as one of a devil's advocate. I have attempted to uncover what may be serious weaknesses in the project design. In my recommendations to US/AID, I sought to design an intervention which would best control and minimize those weaknesses.