PD-AAS-517 :4 6880206 00/53 ANNEX A

ISN= 1011

February 4, 1981

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Evaluation of the Activities of Action Riz-Sorgho regarding Agronomic Practices, Water Control and Management - Project 688-0206

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Note : My first comment is that the evaluation team should have included a senior rice agronomist with agronomic expertise and experience in developing, testing, introducing and evaluating the technical inputs to small farm systems.

I. Perhaps there would be no need to take up the definition of this project once more, but I think it is imperative to remind everyone of the reasons which motivated its creation.

The region of Gao has suffered from the drought that started in 1968. According to the data gathered, one can only envisage irrigated or post-flood crops profiting from the water of the Niger river, the only river in the area. The proposed improvements aimed at building insubmersible dikes and digging of canals which would help in regulating the inception of the submersion in the plains and in protecting the rice plant against fish. The expected result is increased production through better yields and large acreage.

Toward these objectives, the project has included four major interventions:

1. Improvement of rice output on an area of 5,000 ha, through the introduction of improved and treated seeds, better agricultural practices and the reinforcing of existing submersible dikes by manpower, and the installation of water gates and fish screens.

2. Improvement of rice production on a supplementary area of 5,000 ha through the construction of insubmersible dikes with earth moving machinery, and installation of water gates and fish screens.

3. Improvement of sorghum outpu on 3,300 ha through the treatment of seeds, and

4. Establishing a research center to test new varieties, agricultural practices and fertilizer doses.

The measures of project achievement are: annual cereal production in the Gao area increased by 3,750 MT/year; and improved varieties and practices were introduced to 10,000 farmers. The PP estimated production of all cereals within the area served by ARS to be 10,000 tons.

II. Progress towards achieving these goals:

RICE - Area Cultivated (in hectares)

Year	Total Acreage		Improved Seeds		Local Seeds	
	Sown	Harvested	Sown	Harvested	Sown	Harvested
76-77	-	6261	1245	1095	-	5166
77-78	-	6950	3500	1799	-	5151
78-79	8890	6688	1198	805	7692	5883
79-80	8060	2105	1213	713	6747	1392
80-81	7142	-	1375	-	5167	-

RICE - Production (in MT, based on area harvested)

	Total Production	Selected Seeds	Local Seeds
76-77	4295 paddy	678	3617
77-78	4776	1160	3616
78-79	6173	820	5353
79-80	2828	964	1814

RICE - Yield (in kg)

	All Varieties	Selected Varieties	Local Varieties
76-77	686	619	700
77-78	687	644	701
78-79	923	1018	910
79-80	1338	1353	1324

Observations:

1. Acreage:

Using 1976/77 campaign as a base year, the acreage for local variety rice decreased by 0.29% in 1977/78, and by 76.33% in 79/80. Unfortunately, this reduction is not due to giving up local varieties in favor of selected varieties, but only to the low frequency and bad distribution of rainfall.

For the same periods, the acreage in selected varieties increased by 64.29% in 1977/78 compared to the first campaign of 1976/77, but decreased significantly by 55.25% in 1977/78 and 11.42% the following year.

These figures depend on the timely and adequate supply of seeds. The 1977/78 campaign proved to be good thanks to an adequate supply of seeds from the seed producing centers and, consequently, the acreage increased. On the other hand, in the following year, the farmers ran out of seed. ARS which was their only hope to get seeds, did not have

sufficient means to provide it to them.

2. Yield:

Yield has increased both for local and selected varieties. The progressive increases are as follows:

Local varieties: Using 1976-77 as a base year, the yield remains unchanged in 77/78, but increased progressively by 30% in 1978-79 and by 89% in 1979/80 thanks to their hardiness.

Selected varieties: The yields in 77/78 and 78/79 were lower than those of the local varieties due to their inadaptability to the environment and also because of bad cultural practices and poorly trained extension agents. The selected varieties had higher yields as compared to local ones in the third campaign (78/79) due to improved technical practices, more experience gained by extension agents, dike construction allowing the control of the flood, and watering of seedlings with motor pumps.

The decrease in 78/79 and 79/80 is due to bad production in these years. It seems that the figures given by ARS are lower than they were in reality (because notdistinction is made of farmers who use their own seeds which can be selected seed as well). Anyway, if we compare the total number of supervised farmers and the farmers using selected seeds, it becomes evident that the ARS project is far from reaching the goal assigned in the PP.

Year	No. of Farmers using seledted Seeds	No. of Farmers supervised
76-77	1581	141
77-78	2947	8141
78-79	2083	11539
79-80	1425	7899
80-81	1858 (Bara not incl.)	6400 (incl. 3481 for sorghum)

In this table, the only correct figure concerning the number of farmers supervised is the last one (which represents 64% of the project goal). The prior figures had been doubled, i.e. counting 2 for a single farmer who cultivated both sorghum and rice).

Recuperation of seeds:

There is a 15% interest charge to the farmer for seed for one campaign. The recuperation of these seeds proved very poor, as shown by the table below:

Year	Seeds in Tons	Recuperation in Tons
76-77	94.500	-
77-78	135.500	20.566
78-79	89.100	50.769
79-80	108.400	5.281
80-81	108.740	-

Situation of Other Inputs (Fungicide and Fertilizer)

Year	Phosdrin (l)	Thioral (boxes)	HCH (kg)	Urea (kg)
76-77	-	2677	-	880
77-78	-	-	-	6230
78-79	-	6822	12,140	5100
79-80	5	9205	2,595	2105
80-81	-	21701	5,656	1959

The use of fertilizer is experimental because the farmer does not exactly know how much acreage will remain definitely productive, he does not as for fertilizer.

SORGHUM

Year	Area Sown (ha)	Area harvested (ha)	Yield (kg)	Production (tons)
76-77	-	500	420	210
77-78	-	1803	469	847
78-79	1953	1590	512	815
79-80	3629	1958	455	851
80-81	3676	3374	444	1932

It was not possible to determine the area treated versus the area not treated. The only figure available is the amount of fungicide utilized. Though this amount is for both rice and sorghum, it shows how widely this technical package has been accepted.

The analysis shows that an increase of 136%, 243% and 710% was reached respectively in 78/79, 79/80 and 80/81 compared to the base year 76/77.

The acreage increased progressively by 260% in 77/78, 218% in 78/79, 291% in 79/80 and by 574% in 80/81.

This last figure has reached the project goal (3300 ha of sorghum). But unfortunately, the yield remained almost unchanged since the first campaign. The outbreak of Aphis sorghii (plant louse) with a subsequent decrease in yield as of the 78/79 campaign illustrates that the fungicides used in the area are only specifically against black rust.

The increase in production comes from the area made available for cultivation by the dike construction, i.e. the area planted to sorghum was greater than for rice in Tacharane. Hectarage cultivated is linked with timing and the extent of the flood and flood recession - which is now controlled due to the dikes.

Dike Constructionaand Research Center

The insubmersible dike construction began in April 1979. Presently, two plains are protected by 17 km of dikes, 1300 ha in Tacharane and 678 ha in Gargouna. This total of approximately 2000 ha represents 40% of the target set in the PP. That of improving rice production on an area of 5000 ha through introduction of selected and treated varieties of rice seeds and reparation of the existing submersible dikes with hand labor has been initiated. Reparation of existing dikes by hand has taken place in an area that will improve rice production for about 3000 ha. With the delay in dike construction and digging of canals (2 years behind schedule), it is not realistic to expect that the project would reach its targets. These canals are very important to correct the irrigation system, particularly in Tacharane. Logically, water should enter at the higher ground level and flow down to the fields by gravity, however, the system installed at that site is exactly the reverse.

The remaining fourth intervention, the installation of the field research station, was undertaken last year, almost four years behind schedule according to the implementation plan of the PP.

III. DISCUSSION

In hindsight, some observations can be made, namely:

- ARS has suffered from insufficient funding and poorly timed funding.

- There was no separation of credit funds and operating funds.

- The dike construction has experienced a serious delay. The dikes are not protecting the right part of the flood plains, especially in Gargouna).

- The working relationship between ARS and Génie Rural or OTER has been less than effective.

- The research center has just begun operations, almost at the end of the PACD.

- One two trainees have completed an 11-week course in agricultural extension.

- Even though these trainees are not in a position to conduct training of the remaining extension agents, technical assistance needed to support the programs has not been on the list of project priorities.

- The work load (rate of production technicians to farmers supervised) was marked by the availability of one a small number of "agents de base" who had to execute the majority of extension work. These agents are the ones who actually work with the farmers, showing them the improved cultural practices. Unfortunately, their number is too low to effectively disseminate information and thereby impedes extension efforts.

- The technical package offered is very poor (i.e. the fungicide used for seed treatment is not adjusted to the conditions existing; absence of plows; unsuitable improved varieties).

- The project is supporting uneconomical journeys to and from Mopti-Segou to supply farmers with improved seeds, and has never been able to get all of the seeds needed from any single source (Opération Riz Ségou, Opération Riz Mopti, or the multiplication farm at Babougou).

IV. Recommendations

In view of all of these problems it appears that the beneficiaries have no voice in project decisions and no leverage in case they may judge decisions or actions to be unwise. AID must make a concerted effort to improve communication and give full powers to the farmers in the decision making.

With the delays in implementing the work and the absence of canals which will distribute the water in the plains, it is not realistic to expect the project to reach its targets on time. A third dike inside the plain and several canals are needed to correct the error in the irrigation system installed in Tacharane.

ARS should take advantage of the proximity of the water table by digging one or two wells along the edge of the field and grow seedlings (as is the case of the wheat producers in Diré).

In conclusion, AID on timely and project specific work plans.

Technical assistance is very important in developing opportunities for production increase, for devising techniques and evaluating them in terms of usefulness to the farmer. This is necessary as the level of the technical package which directly impinges upon both total production and productivity is very low.

Seed treatment - though it is the most widely accepted of the recommended practices, the project has not yet been able to provide a large range of fungicide to protect the crops against pests.

Use of plow - As the rate of this practice is not significant, training and counselling by the Direction de Machinisme Agricole should be emphasized as well as the creation of an animal traction training center.

As for the use of improved varieties, it must be noted that the selected seed varieties have growth cycles which are longer than those of the traditional varieties, and inspite of their genetic potential, are not well suited to the area because the long cycle increases the chances of loss to birds and insects. It is, therefore, necessary to establish a seed multiplication farm in which selection from local varieties is made which then might prove to be superior to the local varieties in general use now.

The receptivity of the farmers to the introduction of new improved practices depends on their having the needed capital for acquiring the equipment. But in most cases (e.g. the last amendment), the credit funds have been used for meeting operating expenses of ARS. I propose that in the future AID will make sure that a credit system be implemented as foreseen in the amendment.

cc: ADO
DIR/DD
PROG

ANNEX

Further Technical Information on Action Riz-Sorgho /Gao

The northern part of the zone Gao-Bourem comprises an area of 3000 ha exploitable without insubmersible dikes in comparison to the area between Ansongo and Gao which pomprises around 6000 ha in the Hausa plain alone. Some production data, added to the receptivity and loan recuperation problems led me to propose that ARS concentrate its man-power and material in the southern zone.

Comparison of Production:

	Southern Zone		Northern Zone	
	Gargouna	Tacharane	Forgho	Moudakane
1978/79				
RICE				
-Area sown (ha)	1009	663	1415	1288
-Area harvested (ha)	937	649	529	1171
-Yield (kg)	1281	645	1236	904
-Production (tons)	1201	419	654	1059
-Transplantation (ha)	42	60	149	487
1979/80				
-Area sown (ha)	1030	713	1644	1354
-Area harvested (ha)	247	297	32	305
-Yield (kg)	1392	1946	714	920
Production (tons)	344	579	22	280
-Transplantation (ha)	18	100	111	517
1978/79à				
SORGHUM				
-Area transplanted (ha)	90	420	148	162
-Area harvested (ha)	1	410	148	162
- Yield (kg)	266	582	331	308
-Production (tons)	0.266	239	49	50
1979/80				
-Area transplanted (ha)	136	700	516	384
-Area harvested (ha)	98	339	401	85
- Yield (kg)	371	886	188	32
-Production (tons)	369	300	75	2

Recovery of Seed Loan for the last Campaign:

Southern Part		Northern Part	
Tacharane	1920 kg	Moudakane	130 kg
Gargouna	770 kg	Forgho	104 kg
Ansongo	604 kg		
Bara	1853 kg		
Gao	60 kg		

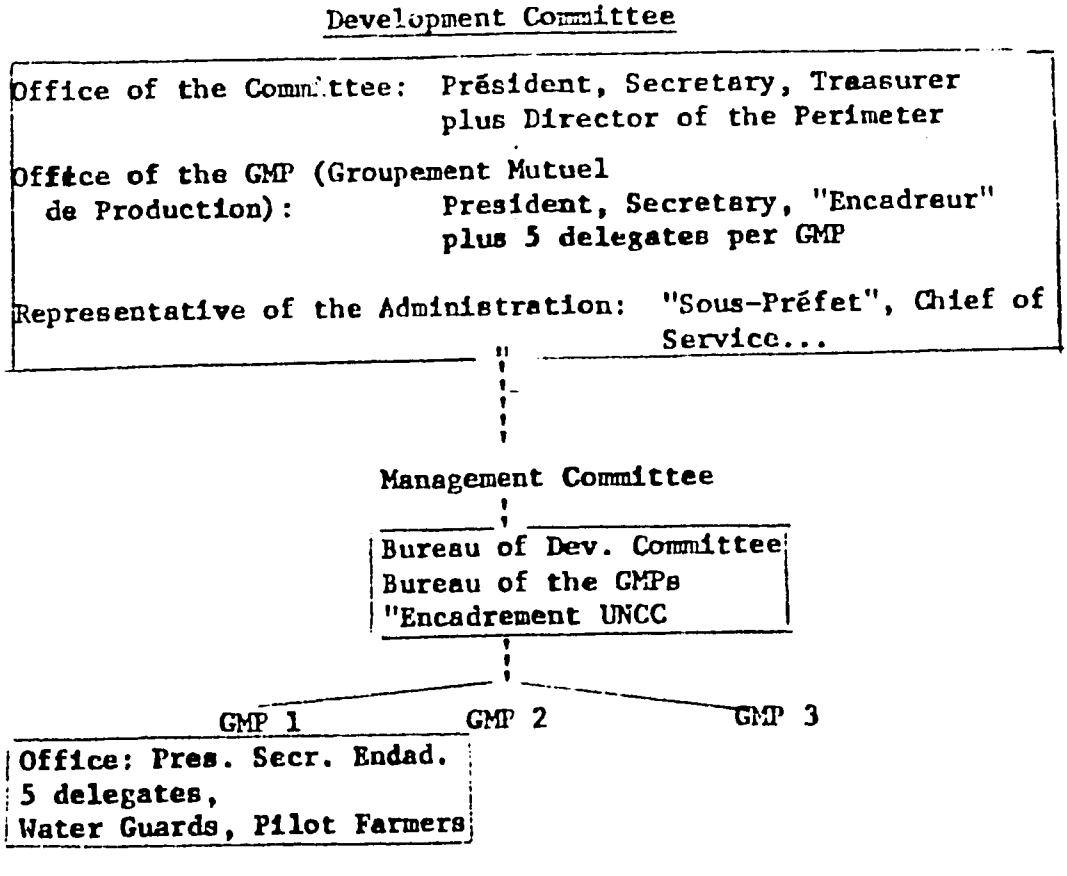
Some important points have to be noted:

- the yield of rice in the southern part has been increasing or at least remained constant during the last two years (in Gargouna and Tacharane there is an increase of 963 versus 1669 kg, in Moudakane and Forgho the yield decreased from 1070 to 817 kg).

  The same observations was noticed for sorghum as well:
  in Gargouna and Tacharane the average yield increased from 424 to 628 kg;
  in Forgho and Moudakane the yield decreased from 319 to 110 kg.

- The conceptualization of the approach.

As have most "Opérations", ARS has also adopted the "pilot farmer approach" as a means of reaching the farming population. The following chart shows the organization set up to reach the farmers around diked areas which I visited in Niger:



Following are observations and information I gathered in Niger which might be useful in planning for ARS:

Relationship between the "GMP" and other services:

These services are: UNCC (Union Nationale de Crédit et de Coopération)
CA (Centrale d'Approvisionnement)
CNCA (Caisse Nationale de Crédit Agricole)
ONAHA (Office National des Aménagements Hydro-Agricoles)

The development policy is as follows:

The State manages the lands for free utilization by farmers.

The land within the irrigation system is entrusted to the ONAHA which can be likened to our rural development organizations. This office not only supervises the construction works but also assures extension of agricultural practices thanks to the existence of its infrastructure and development divisions. It serves also as the intermediary between the farmers and the other organizations mentioned above, as follows:

- The UNCC which deals with
  - the organization of farmers into cooperatives
  - the cooperative promotion and training
  - the procurement of agricultural inputs through the CA (Centrale d'Approvisionnement).

- The CNCA is a bank subsidized by the state. When a cooperative is formed, the regional office of the ONAHA writes to the CNCA to open a credit account for the cooperative.

The cooperative expreses its needs for one agricultural campaign by using purchase orders countersigned by the Regional Office of the ONAHA. All orders duly executed by the president of the cooperative and the director of the perimeter (ONAHA) are collected centrally and sent to the UNCC which delivers and sends an invoice to the regional office of the ONAHA. After verification of the services rendered, the regional director of the perimeter (ONAHA) issues a check signed and countersigned by the presidentof the cooperative. This check is cashed directly by the supplier to the CNCA where a credit has been established in the name of the cooperative.

The recuperation of loans is then made by the bank with an interest charge which is very low, ranging from 6 to 12%.

The expression of needs in form of purchase orders serves to calculate the fees, but on the average these fees are in the oder of 50,000 F CFA.

In summary, the role of the ONAHA consists of the following:

-assurance because of complete control of the water (6,000,000 F CFA to 3,300,000 F CFA per hectare)

- extension agents (2 to 33 agents per perimeter)
- organization of farmers into cooperatives
- training of agents and self-teaching of farmers (of techniques passed on through the cooperatives).

Other information gathered with respect to management:

The distribution of land: - 0,15 ha per user
- priority is given to former owners after which come the neighboring farmers.

The usage contract between the ONAHA and the farmers, as well as the management conditions between the government and ONAHA are as yet in the planning stage.

Rotation - There is no rotation (rice is planted upon rice), the following varieties are employed IR 15/29, IR 122, IR 15, Chinese varieties and de Gaule (floating rice variety for low fields).

Basic seeds and nursery: The farmers are not allowed to have their own nurseries (seed beds). All the surface is obligatorily transplanted to rice.

Mechanization - Labor: At first tractors were used which are now replaced by animal traction because of the high cost of the tractor rental: 11,000 F CFA/ha as compared to animal traction (oxen) - 8,000 F CFA.

The price of the plow is subsidized: 8000 F CFA.

Harvest: A thresher is amortized in two years (the price is 20,000 F CFA).

Irrigation: made with the help of an electric pump; example - for 45 ha, one pump of about 30 CV with a delivery of 1500 m^3/hr is installed.

Types of perimeters in use:

There are only two types in existence - the basin type of which the total manometric height is about 6 m - and the terrace type of which the total manometric height is about 20 m.

Paddy

Ren: Rendement moyen /hec/ 4022 kg > /2 x year

Prix officiel 55 CFA/kg

TECHNICAL EVALUATION
PROJECT ACTION RIZ-SORGHO (688-11-130-206)
(Draft from Partial Notes)

I. The Project Design

USAID funding of the Action Rix-Sorgho project was based on the following investment equation (see Logical Framework, p.3 of PP):

Inputs	Outputs
1) Capital a) Dike and gate construction b) Improved seed and seed protection c) Hand tool purchase d) Field Research Station 2) Technical a) Staffing b) Admin. Support c) Training d) Demonstration	1) 5000 HA of rice, partially protected with yields of 900 KG/HA 2) 5000 HA of rice, completely protected with yields of 1300 KH/HA 3) 3300 HA of sorghum with yields of 600 KG/HA 4) Annual village demonstrations of techniques

This equation was faulty both in its conception and its application.

First of all, this mix of capital and human investment simply will not affect the substantial increases in cereal production desired. Dikes and control gates can ameliorate only one extreme of the flood-drought cycle. By moderating the rate of the water's rise and fall, dikes and gates can assure moisture to both crops over a longer and later period of time than the precipitous rise and fall of the river normally allows

Protection from Rizophage fish is also improved. However, only small increases in yields and acreage can be expected since the dikes and gates do not assure moisture during early rice and later sorghum growth.

With such sparse (300 mm) and sporadic annual rainfall, farmers must have the ability to guarantee moisture to seedlings as well as transplants for strong first growth prior to flooding. The scenario described in the project paper (The farmer "....will be able to shift entirely from broadcasting to transplanting with rising water", pg. 7) is not feasible. In most cases, weak transplants simply cannot take root and begin growth with rising waters in the absence of rain. Nor can farmers delay planting by the six-week period suggested, extending harvest well into the dry season when grain-eating birds are flocking along the river's verdant banks.

Improved seed and seed protection have been responsible for a small increase in rice and sorghum yields. Testing and selecting new varieties through field research will undoubtedly be productive by augmenting this increase. However, even the highest yielding varieties and best protected seeds will fail for lack of a reliable system of water management to insure moisture during the most critical growth periods.

Although sufficially appropriate, the human, "technical" input was also inadequate to achieve higher production. Farmers need the primary technical services of small-scale construction assistance and pumping technology. They stress these as fundamental needs (see reports by Walker 1978 and Putnam, 1978). Such services can be cost-effectively and reimbursably provided through a works section and associated credit scheme. The success of other techniques will depend on the introduction of basic water management on these plains. The project paper, in listing an agronomist with a water resources background, an irrigation engineer, and agricultural and construction techniciansons on the Project Staff (pp. 22 and 24), grossly exaggerates professional titles. "Excellent performance..... exceptional ability... blend of talents..... fully adequate...." are not staff descriptions, but blind overstatements. Neither the Project Staff nor the Project Management are technically trained or focused enough to meet the needs of the agricultural situation.

II. The Project

Personnel: The ARS Staff is basically unchanged since last year. However, the former Assistant Director has become Director (having directed the project and interim often in the past). As confirmed in ARS's annual report, the present staff lacks the competence to carry out a program of improved agricultural techniques. Especially weak are the critical sections of rural works (construction and maintenance), supply (motor pool and pumps among other responsibilities) and training (animal traction, etc.). During a recent visit this was evidenced by:

- The inability to install or to conduct a test program on an animal-powered flow pump;
- Over half of their motor pumps lying idle and non-operational;
- Failure to respond to farmer's requests for small dike construction and pumping services;
- Infrequent and inept animal traction demonstrations;
- Supply rooms in disarray;
- Many project vehicles either disabled or in poor repair; and
- Absence of records on construction costs.

This lack of technical ability is exacerbated by the failure of the project's direction to give priority to technical needs. Within the project's managerial framework, engineering and logistics are generally downgraded.

Furthermore, ARS-farmer relations appear strained. The attitude of ARS Staff towards the farmers borders often on contempt. Both central and field staff on several occasions stated the need to oblige or even force farmers to follow ARS instruction. Yet, the staff did not know specifically what agro-technical package to introduce nor how best to introduce it in consonance with farmers' interests. Illustrative of this extension service-farmer relationship was ARS's reluctance to change the dike alignment to better suit village needs before actual construction and the difficulty experienced with farmers over operation and maintenance

of the system.

And yet, when asked about the most pressing project needs, the new Director replied with construction of extension agent housing, a more independent (from AID) accounting procedure and greater choice of commodity purchase.

Facilities: With its limited engineering resources, ARS has been able to build several small field offices as well as a main office. The field offices and storerooms are adequate, but suffer from poor design (poor use of space, ventilation, and lighting).

The successful, if delayed, completion of a new office building should ameliorate working conditions for the central ARS Staff. However, no improved facilities or renovations are underway for either the engineering or supply sections, another indication of the low priority accorded to technical and logistical operations by ARS management. Future plans include the reconstruction of an abandoned, dilapidated structure as a Director's house and an office for the engineering section. No cost figures were available for any past or present construction.

An adequate facility for a strengthened works sections would include offices for the engineer, the surveyor and their secretary, a drafting/design room, stockrooms, a supply warehouse and a garage with parts and tool storage. A strong operational section is a priority for a functional project.

Works: A detailed technical evaluation of the flood control works financed by this project is found in an earlier report, relevant portions of which are annexed. The significant points are as follows:

1. The scale of the major works was too large and ambitious; the works strained both USAID and the contruction contractor's (OTER's) capabilities, are beyond ARS ability to operate, and are not immediately relevant to farmers' needs.

2. The affected farmers had little (and then, only after vocal objection) involvement in the design and construction of the large works, due in part, to the previously mentioned scale of the operation.

3. Both the engineer (Genie Rural) and contractor (OTER) proved themselves competent to deisgn and construct such works. Again, mistakes were for the most part due to overambitious scale of the undertaking. OTER was invaluably assisted by $600,000 of AID-purchased earth-moving equipment. The development of the capability of this construction organization, is a most cost-effective investment in Mali's agricultural sector.

4. ARS does not have either the operational or technical ability to follow the construction of such works, to maintain them, or to design and help construct smaller flood control works.

OTER's current construction of the research station at Bagoundie is dissimular from last year's in that both more time is allowed and more precision demanded. The latter is causing some difficulties since OTER has less experience with intensive, controlled irrigation systems. More-

over, the ARS Staff did not appear to understand the system, nor have the ability to operate it. No ARS Staff member has been following the design and construction. And, initial tests in the submersion perimeter were a total failure for lack of ARS follow-through and interest. Several years of technical assistance and training will be necessary to assure operation.

Equipment: A tour of the ARS garage, warehouse and storage rooms clearly shows this organization's lack of technical management and competence. ~~There is simply no demonstrated, priority interest in operations or maintenance, which has resulted in idle vehicles, pumps and agricultural equipment~~. Motor pumps are particularly critical due to heavy farmer demand for rentals during early rice growth. However, the ARS office at Tacherane which in principle serves approximately 500 farmers(?) (check ARS statistics), had only two 6HP pumps of which only one was operational during the planting season. Gargouna's office had three 4-5HP pumps, but only one was rented out (one broken and one "too heavy" to move).