

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT REVIEW PAPER FACESHEET

1. TRANSACTION CODE

A

A ADD
C CHANGE
D DELETE

PRP

2. DOCUMENT CODE
2

3. COUNTRY/ENTITY
Senegal

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06

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SAED Training Project

8. PROPOSED NEXT DOCUMENT

A. 3

B. DATE
MM YY
06 77

9. ESTIMATED FY OF AUTHORIZATION OBLIGATION

A. INITIAL FY 78

B. FINAL FY 82

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$1 -)

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	250	750	1,000	500	2,000	2,500
(GRANT)	250	750	1,000	500	2,000	2,500
(LOAN)						
OTHER: 1.						
U.S. 2.						
HOST COUNTRY		140	140		700	700
OTHER DONOR(S)	250	400	600	400	800	1,200
TOTALS		1,290	1,740	900	3,500	4,400

11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1) FN	240	2,500		1,000		2,500	
(2)							
(3)							
(4)							
		TOTAL		1,000		2,500	

12. PROJECT PURPOSE (Maximum 480 characters)

"X" IF DIFFERENT FROM PID

To assist SAED, the regional development agency for the Senegal portion of the Senegal River Basin, to develop a training program for upgrading the skills of its personnel.

BEST AVAILABLE DOCUMENT

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15? IF YES, ATTACH CHANGED PID FACE SHEET.

1

1 = NO
2 = YES

14. PLANNING RESOURCE REQUIREMENTS (Staff/Funds)

Agriculture Extension Education Specialist, Agricultural Engineer, Agricultural Economist, Design Officer. 4 1/2 pm. \$40,000.

15. ORIGINATING OFFICE CLEARANCE

SIGNATURE

[Signature]

TITLE

Regional Development Officer, Dakar

DATE SIGNED

MM DD YY
11 30 76

16. DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W DOCUMENTS. DATE OF DISTRIBUTION

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PROJECT REVIEW PAPER

SAED TRAINING

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I. PRIORITY AND RELEVANCE

A. SUMMARY

The project proposes the financing of training of technicians and extension agents for the "Société pour l'Aménagement et l'Exploitation des Terres du Delta" (S.A.E.D.), the regional development organization responsible for the expansion of irrigated farming in the Senegal River Valley.

B. BACKGROUND

Agriculture is the mainstay of the Senegal economy. Small-scale farms account for 70 percent of the population and 95 percent of the country's agricultural production.

Senegal's annual food grain imports are approximately 150,000-200,000 tons of rice, 80,000-110,000 tons of wheat and some 50,000 tons of other cereals, including sorghum and millet. Dependence on the world market absorbs 15-20 percent of total export earnings. To reduce its dependence on food imports which total approximately 300,000 MT annually, Senegal is attempting to increase production of grains such as millet, the main foodcrop; wheat, as a possible dry season irrigated crop along the Senegal River; and rice, major production of which will depend on irrigation schemes along the Senegal River.

The agricultural potential of Senegal is severely limited by sparse rainfall, which occurs in a short period of the year, and by relatively poor soils. In the Senegal River Valley, rainfall is marginal for cropping, averaging some 400 mm, and soils over much of the area are sandy. However, heavy, bottomland soils and coarser soils of the flood plain are used for flood-recession cropping. Since rainfall is by and large unpredictable, the efficient use of water resources is the first means of ensuring production in a given year.

When one considers irrigation schemes in Senegal, the focus of attention is on the Senegal River. The Senegal River is the second largest river in West Africa. The River basin occupies over 14 percent of the area of Senegal, almost 13 percent of Mali and Guinea, and about 7 percent of Mauritania.

1. OMVS:

In 1971, the three riparian nations of the Senegal River: Mali, Mauritania and Senegal, formed a cooperative organization to plan and carry out the coordinated development of the Senegal River Basin under an agreed plan. This is the "Organisation pour la Mise en Valeur du Fleuve Senegal" (OMVS), in which all three nations actively participate. Under the OMVS charter, these three nations have agreed to the priorities which will govern their planning. These are: (1) to assure the stability of the population now living in the basin by using the river's resources to improve their livelihood; (2) to insure that the ecology of the basin will not be adversely affected by projects therein; and (3) to develop the basin as a surplus food-producing region.

Under OMVS auspices, various studies and projects have been, and are, underway to realize the river basin's fullest potential as an integrated river system. The principal mainstream components of this system will be two dams operating in concert: one low-level dam in the river Delta to arrest saltwater intrusion during the low water season, and one storage dam on the principal tributary of the river in Mali to assure sufficient flow for irrigation and navigation on a year-round basis.

While these mainstream components are being developed; various food production programs are being initiated to prepare the population of the Senegal River Basin for their eventual participation in irrigated farming in lieu of their traditional post-flood recession cropping on the river basin. In accordance with the OMVS charter, agricultural projects totally within the boundaries of any of the riparian members are to be negotiated on a bilateral basis between that riparian and the prospective donor.

2. S.A.E.D.:

For development of irrigation projects using the water of the Senegal River throughout the Region du Fleuve in Senegal, the GOS Ministry of Rural Development created an autonomous branch entitled "La Société pour l'Aménagement et l'Exploitation des Terres du Delta" (S.A.E.D.). Established with its headquarters in St. Louis to concentrate initially on the delta area of the river, its mandate has now been expanded to include all lands on the flood plain of the Senegalese side of the river. Accordingly, it has moved up from the delta into the upper basin with the realization of the IBRD-financed

irrigated perimeter at Dagana and the F.E.D. financed perimeter at Nianga. S.A.E.D. has also established pilot farms at the perimeters of Matam and Bakel. AID assistance to both the Bakel and Matam projects is substantial and is outlined in Project Papers N°685-215 and 628-0701.

Since its creation in 1965, SAED has brought under intensive cultivation (irrigated rice) some 10,000 hectares of valley land. Its goal is a far higher rate of development in the immediate future to average nearly 5,000 hectares per year during the period ending in 1985.

With a reasonably well assured prospect for international funding of infrastructure and operating requirements, the attention of the Government and of the donors has focused on the question of manpower. Clearly, the pace of development will be determined by organization, skills, understanding of the tasks, motivation, the capacity to cooperate, and the effectiveness of collaboration between public authority and farm groups and individuals.

A number of international groups have assisted the Government in its evaluations of the manpower and training requirements in the SAED and OMVS structures. The IBRD, FAO, UNDP, two French consulting firms (known by acronyms as SCET and SATEC), an OMVS study group, the Government's Organization and Methods Office, University students and SAED itself, have all participated. In 1975 AID sponsored a study of management requirements of OMVS and in early 1976, AID commissioned ORT to review the record and make recommendations on the training capacity and extension function of SAED. The present PRP and its specific proposals draw from all these sources.

C. RELATION OF THE PROJECT TO SENEGAL'S DEVELOPMENT PRIORITIES

Noting that the improved use of water resources is vital to Central Water African Development, the DAP summarizes the main goals of assistance to Senegal in this sector as (a) increase in food output, (b) defense of the agricultural base from natural hazards such as drought, (c) equitable distribution of increased revenues from such development to the poverty stricken populations of the river basin, (d) contribution to halting ecological deterioration of the Sahel zone, and (e) easing the pressure on other areas of Senegal and West Africa of migration and "exported" poverty.

Senegal's own goals as expressed in its mandate to SAED are of the same order as and consistent with our own: to increase food output and raise peasant income in the valley; to enable the farmers to engage in multi-crop irrigated agriculture; to enable the farmer to take over production and marketing functions initially performed by SAED; to help overcome the national food deficit; to arrest rural-urban migration by improving conditions in the valley, socially, culturally, and economically; and to protect agricultural production and the entire rural milieu from irregular climatic conditions.

Since the project would engage in training virtually all employees of SAED -administrators, technicians and field agents- and all the private-farmer production-cooperative leaders, the project bears on all SAED functions and hence relates to the entire development scheme operated by the national agency.

The US Role

The United States, in determining the importance of these activities and in designing its participation in them, decided at an early date that the program merited all possible international cooperation and all appropriate US assistance and it decided that its support should take the form of intervention at critical points and in matters where it had superior skills and experience. Apart from large capital investment in river basin development (Matam and Bakel Projects, for example), the DAP recommends other relatively small scale involvement projects, as part of its continuing interest in the region, for the reasons that, (a) river development is a high priority in Senegal's national planning; (b) water resources and irrigation are areas of US expertise, as is the range of factors that must be integrated in any such scheme, and (c) such assistance harmonizes with AID philosophy in other sectors where, for example, early benefits to farmers can be achieved with small investment through the development of basic skills.

D. PURPOSE OF THE PROJECT

With Senegal, along with Mali and Mauritania, "poised on the threshold of an enormous venture", as the DAP puts it, the difficulties SAED faces are "sobering". The goals are high: 50,000 hectares prepared for intensive cultivation by 1985; tripling rice yields per hectare from a present figure of under two tons to six tons; increasing rice production by a factor of 3.5 in the same period, from 33,000 tons to 114,000 tons, and continuing for a 35-year

program-period the effort to bring under development the 275,000 hectares that lie in Senegal.

To say that the SAED program has raised incomes by some 2.5 times, where the program already operates, is to say that a great opportunity exists. However, the investment cost, for cultivation alone, is high. Moreover, the charges to individual farmers for the services SAED provides, such as land preparation and seeding (exclusive of dikes, dams, pumping stations and the like), cut into the farmer's potential profit, for the reason of inefficiency and waste in providing the services. Put another way, the training of mechanics to properly maintain tractors and the training of farmers and their organizations eventually to perform the main tasks by labor-intensive means, are two of the characteristic requirements of a successful and economic program.

While Senegal is the most endowed in trained manpower of the three OMVS states and is therefore the most prepared to profit speedily from external capital assistance, the necessarily high targets impose a burden on SAED's organizational, managerial and technical capacities. These constraints must be addressed through intelligent and adequate training. A general reordering of education and training -such as the improvement of secondary education or the establishment of national centers of hydrological engineering- does not come to grips with the specific challenge and the essential time-tables presented by the Senegal Basin development. The project proposes an intensive and comprehensive training program targeted exclusively on SAED, and on site. The principal new institution proposed, a center for training in irrigation technology, at Savoigne, near St. Louis, will ultimately help relieve the shortage of technicians nationally; but it will be reserved for at least five years to the more urgent and specific need of SAED. Similarly, the subsidiary training centers on the main irrigation perimeters, eg, the heavy machinery center at Ross Bethio and the Nianga center for training heads of cooperatives, are designed for the SAED context and serve it directly.

In SAED planning and budgeting to date, training has been underemphasized. This may result from the erroneous assumption that infrastructure development could precede the development of manpower. It is now apparent that training, as well as the smaller land preparation works, can and must expand and mature on a schedule in advance of construction of dams and dikes.

The project purpose would include the process of reinforcing the training branch of SAED vis a vis other divisions of the organization. To date, this branch is a subsidiary -one among five- of the Office of Research and Programming. The project will strengthen this vital function and have the broader consequence of redirecting the agency from purely production goals, which were adopted in the first years of SAED operations, to the "people" goals and problems that will determine success of the venture from now on. Fortunately, this shift is presaged by SAED's greater understanding of the fact that heavy mechanization threatens to overwhelm the average farmer and that the less mechanized approach to irrigated farming requires an adequate training of both staff and farmers.

SAED's training function in the field includes three elements: literacy, extension and cooperatives. The project would strengthen the SAED training branch's capabilities in these functions. In addition, SAED would undertake two functions which have received little or no emphasis: (a) the training of upper technical, administrative and management echelons and, (b) intensified training of heads of cooperatives (or chefs de groupements).

The purpose of the project is the training of all SAED employees in necessary skills, and the training of farmer-leaders, in order to:

- a. Increase the capacity of SAED to train farmers to take comprehensive responsibility for cultivation;
- b. Provide SAED with planning and administrative capabilities making more efficient the entire SAED enterprise;
- c. Reduce operational costs of SAED, thus to increase farmers' revenue, and;
- d. Improve the understanding and rapport between SAED and the peasant population.

II. PROJECT DESCRIPTION

A. Elements Provided

The project will fund and provide over a five-year period:

1. Capital Investments

a. Construction and equipping of an irrigation technology center at Savoigne. Irrigation and hydraulic engineering are the principal high-level skills required. Trained personnel, already in short supply nationally, are required to anticipate rapidly expanding needs. The center would be the first of its kind in Senegal.

b. Supplies and equipment for the construction and maintenance of four training subcenters on site at the major irrigation project perimeters. A fifth center at Nianga would be brought up to the level of perimeter subcenter. The training subcenters would concentrate on operational, i.e., vocational-industrial skills.

c. Improvement of the Nianga center to increase its capacity as the principal SAED facility for training farm cooperative leaders. Eighty such chef de groupements are to be accommodated at a given time, against a present capacity of 50.

d. Equipment for the agricultural machinery maintenance center at Ross Bethio. The purpose here is dual: to increase the center's capacity to handle machinery and to provide means to make it a training site for mechanics.

2. Technical Assistance

a. A senior agricultural technician/project manager and one agricultural assistant/instructor. These two expatriate advisors will be stationed at the Savoigne center, near SAED's headquarters at St. Louis.

b. One mechanical engineer/instructor, to be stationed at Ross Bethio. As do Savoigne and Nianga, Ross Bethio will serve simultaneously as site of a major training component of the project and as headquarters of the second-echelon perimeter organization.

c. The project will also organize and staff management seminars for top- and middle-level administrative/management personnel of SAED. They are planned for a capacity of about 65 trainees per year, and would be on site rather than centralized, near the jobs of the participants.

3. Preparation of Senegalese Counterparts

Senegalese instructors and training center managers will be prepared for taking over the new facilities and operating all activities associated with the project by on-the-job training and by short- and long-term participant training abroad.

4. Project Evaluation

In the complex task to be undertaken by the project, continual assessment of its work will be necessary, as will be flexible reactions in adjusting the program to lessons learned. Training evaluation is an integral function of the project, just as it must be for the SAED enterprise as a whole.

5. Budget

SAED is expected to have a substantial training budget which will include the salaries, allowance and logistic support of trainees as well as provision of furnishings for expatriate personnel and salaries of training and administrative personnel.

B. Project Outputs

"Project inputs" will be applied to two principal groups, SAED staff and the valley farmers. The changes wrought in these groups constitute project "output", in addition to certain pedagogical products such as developed training curricula.

In the SAED group there will be personnel trained and retrained in more effective extension work, wherein they advise and teach farmers in irrigated cultivation and educate them to the structure and operation of cooperatives. There will also be staff improved in the administrative skills, at all levels, and in control functions such as planning and budgeting. A large number of SAED staff will be taught mechanical, maintenance, electrical and other

operational techniques. SAED's corps of senior irrigation and hydraulic technicians will be augmented, for current and expanding SAED needs and, in the long-term, for service to basin development projects elsewhere in Senegal. Finally, all members of the SAED organization will be sensitized, informed and motivated as to SAED's goals and will be given a basic sense of participation in the work leading to them.

Project outputs sought vis-a-vis farmers participating in SAED irrigation projects are both individual and collective. Farmers as individuals would gain functional literacy. They would become more skilled in irrigated agriculture and the use of animal traction. And they would become more autonomous individually and in groups in their productive tasks. In the collective sense, farmers would participate more effectively in agricultural development and leaders would discharge more effectively the responsibility of cooperative management.

C. Project Activities

There are seven principal sites at which the various training activities will be located:

1. At Savoigne, 30 km northeast of St. Louis, the Center for Irrigation Technology will be built. As early as summer 1977 the project manager designate would, in collaboration with the SAED Chief of Training, Mr. Oumar Ba, prepare an inventory of equipment and supplies for the Center and for each of the other activities. They would also draw up a list of priority trainees for Savoigne and other centers. Courses would begin in May 1978.

A staff of two expatriate specialists/instructors and eight Senegalese counterparts will provide short- and longer-term training for some 180 people in the first four years of the Center's operation during the five-year project period. For 145 of these the training will be "perfectionnement" of employees already on board; 35 new employees will gain a more basic education. Sixty of the total will be trained in top management skills, 120 in irrigation, hydraulics and other techniques. All will belong to headquarters offices, either in St. Louis or at perimeter field headquarters.

2. At Ross Bethio, upriver 15 km from St. Louis, another 150 SAED personnel will be trained in perimeter operations and project management functions such as store-keeping, secretarial, accounting, etc.

Also at Ross Bethio, where the central machinery is located, some 73 senior mechanics and machinery operation supervisors of perimeters will receive training.

In addition, at Ross Bethio and at the several perimeters, 184 machine operators and vehicle chauffeurs as well as 171 mechanics, welders, lathe operators, electricians and other tradesmen and maintenance personnel will be trained.

Ross Bethio facilities already exist, both for project operations management training and mechanical training. The project will provide training for the trainers there and a modest quantity of additional repair and training equipment and supplies.

3. The five training subcenters will be located (in order, as one travels northeast and then southeast the 500 km along the river to Bakel) at Dagana, Guede, Nianga, Matam and Bakel. Here, training of the extension agent corps will take place for some 170 trainees during the life of the project, plus training for about 30 perimeter office supervisors. A simple classroom at each center, for 20 trainees at a time, a kitchen, messhall and dormitory will be provided. The intention is to supply materials for such construction and engage trainees in the work to the extent possible.

4. Not an additional site, but a facility to be improved for its second function, is the Nianga center established under an ILO-sponsored project. This will be the central training facility for farmer chefs de groupements, or cooperative leaders. The principal purpose is to expand the Nianga center's capacity to 50 to 80 farmer trainees at any given time.

5. In addition to the eight Senegalese trainers required at Savoigne, a total of 24 trainers (agents) are required for extension work directly with the farmers, eight are needed for training of farm leaders at Nianga not including one ILO specialist at site, and four for the Ross Bethio mechanic training function. At present, the training staff for all levels numbers 20. The project will thus undertake an important training-of-trainers task.

D. Other Characteristics of the Training Program

1. It is a basic concept of the program that each group trained, each individual trainee, himself takes on a

"training profile", i.e., becomes a trainer of others. This applies not only to those formally trained as trainers but to all others, particularly the cooperative leaders. These farmers have perhaps the most critical and responsible role of the program. to go back to their village perimeter to help organize and motivate their neighbors in the cooperative to collective irrigated cultivation. The multiplier here is approximately 15, each cooperative grouping that number of families.

2. The training that affects individual farmers and farm leaders will be substantially changed by the project as to concept and methodology, and SAED's capacity to delivery such training will be increased with new materials, notably audio-visual and other training aids.

3. At the perimeter level and at the new Irrigation Center, the training program will be developed and changed as to curriculum, goal, method and facilities. Here, the pre-training task of examining and defining SAED personnel needs is emphasized.

E. End-of-Project Status, Indicators of Achievement, Goals

Over the life of the project some 1000 officials and technicians will receive training. Many of them will have engaged in the extension training of farm leaders, principally in the organization and operation of cooperatives, and of ordinary farmers principally in functional literacy and basic farm operations, using both existing facilities and additional materials and facilities provided by the project.

As one level of measurement, a single tool will be used: performance evaluation of staff and of the training branch will provide analytic information on the overall quality and success of the project.

At another level of evaluation, entirely different indicators of success will be available, i.e., the results of SAED work. Indicators in this matter fall under two headings: one is change and development in the inclination and capacity of individual farmers and their production groups to handle irrigated farming and perform functions initially done for them by SAED, the other is the quantifiable and measurable factor of SAED production cost and the

amount it charges farmers for services performed. Further development of concept and methodology in making these assessments should be considered a function of Project Paper development.

Success of the project in contributing to the sectoral goals of increased cereal and vegetable production and higher per capita income in the valley are subject to conventional econometric analysis.

III. AID AND OTHER RELATED EXPERIENCE

AID and other cooperating organizations have considerable experience in all areas of training covered by the PRP, and there are no technical or management problems which can not be handled adequately. Well defined programs in the managerial and technical aspects of irrigation which will be the focus of the national center at Savoigne have been carried out in several developing countries by AID, IBRD, FAO, FAC, and other specialized agencies. The same is true for other agricultural aspects of the program including agronomy and the production of specific crops such as rice, wheat, tomatoes, and vegetables.

AID has successfully implemented many heavy equipment management, operating, and maintenance programs including several in Africa. The techniques are well known and several U.S. or European groups are available to provide technical assistance for this type of training.

The farmer extension program which is a vital part of training covered in the PRP must be specifically designed to take into account the particular sociological and anthropological factors of the various ethnic groups which live in the area. The differences in their traditions, values, and social structures must be carefully examined in order to use methods which can tend to help overcome restraints and to foster active farmer participation and cooperation.

Although this training thus poses more difficult problems than the purely technical aspects, there is a reasonably good base to work with. SAED itself has had more than 10 years of experience, and has at least learned many of the methods which do not work, and as a result has been able to gradually evolve a more effective and comprehending approach to the problem. Numerous studies have been made over the past several years by specialists in sociology and anthropology, and there is a growing resource base of information which can be used to permit a better understanding of motivation, values, and incentives.

AID has recently carried out sociological studies in connection with the Bakel and Matam projects in the Senegal Valley. These have been done with the slowly increasing number of Senegalese sociologists who are being used by development organizations such as SAED. There is thus a growing awareness of the importance of these factors, and European and American specialists working with Senegalese are more familiar with requirements than in the past.

A body of knowledge which can be used in extension training in Senegal has likewise been developed through the active programs of both SODEVA in the Groundnut Basin with AID and other donor financing. This agricultural extension organization, assisted by Promotion Humaine, has been able to develop an effective extension package which brings not only technical improvements to small farmers but also prepares them to accept technological improvements through careful attention to their traditions and motivations.

It is therefore believed that sufficient expertise is available to successfully implement all parts of the proposed training program.

IV. PROJECT BENEFICIARIES

A. Summary

The intended beneficiaries of the project are rural farmers indigenous to or recently resettled along the southern bank of the Senegal River from Dagana in the west to Bakel in the east. All are presently engaged or will be engaged during the life of the project in cultivating rice, tomatoes and certain other crops on the newly-irrigated lands developed by SAED. The principal ethnic groups living in this Sahelian region of Northern Senegal are the Toucouleur (62% of the population), the Wolof (25%), the Peuhl, the Peuhl and Toucouleur having a common language but not a common culture, and the Sarakole. All four groups practice mixed farming and some fishing and foraging, although the Peuhl remain semi-nomadic and have also a traditional interest in cattle raising.

These tribes appear to be living with each other in the valley with few conflicts. Training services will be delivered equally to all four groups. There are few disparities in the per capita income among those currently in the valley. Of the total population of the valley, 16% are in zones developed and serviced by SAED. The valley population is one of the poorest groups in Senegal.

Using 1971, the year when more intensive SAED operations began, for illustrative purposes, per capita income of Senegal was estimated to be about \$250. Rural income was estimated to be about \$100, or about 42% of the national average. But the income of peasant farmers in the Senegal River Valley was \$35, or about 13% of the national and 32% of the rural level. This dramatically shows that farmers in the Senegal River Valley have been among the poorest.

The SAED and externally-assisted program will train approximately 870 chiefs of production groups by 1982. Each group chief is responsible for training 15 to 20 families. Given an average family of 5.9 members, the program will benefit in this way some 75,000 - 100,000 individuals.

The project will have indirect effects on farmers not trained by SAED - both in the River Valley and outside. In the first instance, non-serviced individuals will benefit from the "demonstration effect" by observing and imitating skills learned by their neighbors. Moreover, farmers who have moved

into irrigated perimeters tend to maintain contact with their original villages. The Toucouleurs of Kassak Nord and Kassak Sud return in order to grow tomatoes, millet, sorghum and garden crops, mainly for family consumption. Some also grow rice in "walo" land in the home village. In such cases, skills learned under SAED auspices will transfer outside the SAED zone. The training program outlined in this paper will have an internal multiplier effect as well. SAED trains its extension agents in the central office who, in turn, train extension agents working in the six perimeters and these latter train chiefs of production groups, who then train family and neighbors. This process combined with the external multiplier will have an obviously extensive impact.

In addition to peasant beneficiaries, SAED's personnel will benefit from an improved ability to administer services. The skills will be used by SAED in working toward its long-run objectives. They will also be used in other organizations and institutions of Senegal to the benefit of the nation as a whole as and when SAED phases out of the picture.

B. Socio-Economic Factors

1. Existing Structures

In all the groups concerned, Toucouleur, Wolof, Peuhl and Sarakole, rights to use the land, whether for farming or herding, are held collectively and in perpetuity by the kinship group descended patrilineally. The authority to allocate given fields for cultivation by individuals is reserved to elder males. Such allocation is valid only so long as the land is in use or legitimately fallow. Land is inherited on the same pattern.

Serfdom has persisted in all the groups, but is dying out as former serfs gain access to land on their own account under the protection of Senegalese law. Doubtless they and others of like status are attracted to SAED activities for the opportunity they are afforded of social mobility.

The land is traditionally worked in the valley with hand tools, without traction, with little fertilizer, and under a flood plain irrigation virtually without water control measures.

Harvested crops are redistributed within the kin group qua production unit. Goods also move between lineages united by marriage. Indeed, the market is superfluous to the system by which most subsistence goods are distributed. It functions mainly for the allocation of small surpluses, craft products and, in the case of the Peuhls, dairy products.

As farmers now working or likely to work with SAED traditionally procure their subsistence needs in land, food, shelter and water outside the market economy, cash income is used mainly for "non-essentials" such as manufactured goods such as cloth, kerosene, medicine and taxes.

Consequently, the production of a cash crop on SAED developed lands entails not only the adjustment to an innovation in technology but also a change in economic organization. The shift is from an autonomous, subsistence way of life to a system of cash crop production and marketing, purchasing of necessities and purchasing of production equipment, supplies and services.

The position of women is clearly inferior in all the ethnic groups concerned with SAED. They rarely own land or animals, even in the limited sense of ownership indicated above. Most of the income produced by their farm labor is controlled by their husbands or the elder male member of their lineage.

In general, the patrilineal authority is the basis of a tightly-integrated pattern of adaptation, social, political and economic, to the set of technological and environmental changes presented by the SAED program. Note that the authority and the pattern are sanctioned by localized interpretations of Islamic tradition and by still older beliefs and practices indigenous to the valley and the tribes. Those who deviate from the rules of this order risk the withdrawal of social and economic support of their fellows and, possibly, supernatural punishment.

2. Inducements to Techno-Economic Innovation

With memories still vivid of the recent drought, with a growing desire for money to purchase manufactured goods now becoming available, and with the need to pay taxes, it would seem likely that all segments of the rural population have a motive to collaborate with SAED, i.e., to undergo

its training, to adopt those technologies required to make them settled farmers, and to create a surplus, beyond their personal needs, convertible to cash.

Given the near total absence of urbanization or industrial development in the "target" zones of the valley and the absence of alternative means of making a living or a cash income, realization of SAED manpower training objectives would in fact benefit the rural poor. Those outside the scope of SAED activity will benefit indirectly as the economic environment improves around them.

SAED participants will benefit in that the training will provide them with skills necessary to utilize productively the resources made newly available and the opportunity for year-round cultivation. There is also the benefit coming with new crop varieties, from mechanized assistance in land clearing, cultivating and harvesting, and from access to fertilizers and pesticides, all of which would contribute to a potentially major increase in the productivity of the land.

3. Constraints and Caveats

An essential of success in the training and operation of the SAED program, however, is that it not unnecessarily destroy traditional foundations of psychological, economic and social security in the communities affected. When, for example, existing rights in land and existing authority patterns are upset, the rights and patterns substituted for them in the new context must be understood, and must be equally secure. Similarly, the rates charged by SAED must be understood as necessary and equitable. It is the responsibility of the training program to develop such understanding and to provide reason for farmer confidence in the contract with SAED and in the rights conveyed by it and by the cooperative arrangement. Otherwise, clearly, the farmers will not withstand the stress of adjusting to new culture patterns, nor will they lend themselves to SAED objectives.

Another constraint is the reluctance that may arise among farmers to jettisoning the tradition of local socio-economic self-sufficiency in favor of what may seem a dangerous reliance on cash incomes. Cash is certainly desired, but not in circumstances where it is incapable of creating personal security and confidence in the system.

Thus farmer rights in irrigated land must be explicit and must be made clear to farmers by complete disclosure and explanation of the contract.

Compatibility between the socio-economic structures introduced by SAED and those of the patrilineal system must also be assured, with respect to the recruitment of farmer-trainees, concepts and allocations of time, vehicles and occasions for optimum communication, the division of labor between sexes, etc.

A conflict should be assumed to exist between SAED's definition of rational time-allocation and that of the farmers. The reason is that social and ritual obligations that may seem extraneous to SAED are, in fact, essential within the farmers' network of reciprocal ties, to the stability of their society and to personal security. They may forego field work in favor of apparently non-productive activity such as visiting a sick kinsman, helping build a neighbor's house or attending a funeral. It is important that SAED not miscalculate the real amount of discretionary time available for work and not assume a lack of ambition or personal value that may not be the case.

Also to be taken into account are different customs among various ethnic groups as to division of labor between ages, sexes and social strata. These customs materially affect the available work force in any given situation. The Toucouleur and the Peuhl especially are concerned with controlling women's productive activity, to the extent that they may inhibit women's capacity to benefit from training and achieve their productive potential.

The question of who SAED picks as village representatives to be trained and to carry its message back to the "groupements" is a vital one and one on which there appears to be insufficient guidance in the literature or other sources. In some cases in the past, the choice has been a farmer with high status. Alternatively and in uncertain times, the young or socially marginal have been chosen. This may have the advantage that these individuals are open to change and capable of quick learning, and the disadvantage that when they return to train their neighbor they will not be listened to. A strategy in this matter should be developed which assures equity and efficiency without bringing out resistance to improvement.

A strategy with respect to women, also, is of prime importance. The project will presumably bring them

increased earnings and social mobility, thus helping them overcome their traditional subordination.

In this connection, it should be noted that SAED has taken significant steps to more fully define the particular problems of women in the Senegal River Basin in order to better use the particular resources which they can bring to bear on the development of the Basin.

SAED has added a highly-qualified woman sociologist to its staff to coordinate extension training, literacy training, etc., to be carried out in the perimeters being developed. Several "monitrices" (women community development workers) have been made available to SAED by the Promotion Humaine Service and they are beginning work in villages in literacy, basic sanitation, child care, etc.

As conditions permit during project implementation over the next several years small projects will be developed which can permit women to organize for small economic activities such as vegetable gardens, local marketing and simple food processing.

4. Conclusions

The overall conclusion reached after considering these problems and risks is that there is no inherent reason why the different sensitivities and interests cannot be accommodated. Considerable research and analysis in this field have taken place and will be continued. The results of these studies will be introduced into the SAED training program. Periodic evaluations which are scheduled within the framework of the project will be alert to the social aspects of the project and modifications which are warranted will be made.

V. FEASIBILITY

The development of the Senegal River Basin is a high priority for the Government of Senegal. Assuming that the region continues to enjoy the same priority with the donor group that it now does, the GOS believes that as much as 5,000 hectares can be developed for irrigated farming each year until a total of 50,000 hectares are completed - approximately in 1985.

The complex technical problems of integrated development of the valley are being considered fully by the OMVS for the river basin as a whole, and by the Government of Senegal in its planning for the individual projects in the valley. Two major water control dams to be built on the Senegal River will assure that adequate water resources are available for large scale irrigation. The Diama salt intrusion barrier dam, scheduled to be completed in 1980 will allow the irrigation of 50,000 additional hectares in Senegal, while the proposed Manantali Dam, which is in the planning stages, will eventually permit some 250,000 additional hectares of irrigated, two-crop production, in the three riparian states.

Production techniques used by SAED following its creation in 1965 tended to be capital intensive in spite of the fact that Senegal's most abundant resource is labor. This policy is gradually changing and there has been a definite shift to the development of more labor intensive, small perimeters where possible such as in the AID Bakel project. The practice of moving people into villages close to large scale perimeters has been stopped in favor of a policy of creating small perimeters where villagers are presently located and large perimeters where there is not an adequate labor supply. SAED's long run objectives are to make the large perimeters (Delta, Dagana, Nianga) capital intensive and the smaller ones (Guede, Matam, Bakel) more labor intensive with smaller plots.

Economic Analysis

There is a general lack of the necessary data on SAED and the Richard Toll sugar cane project which makes calculation of net present discounted values and of internal rates of return, necessary to carry out sensitivity analyses, difficult. Nevertheless, a calculation of the direct benefits to SAED and to farmers, using informal techniques supplemented with quantitative analysis where data exists has been made in connection with the potential benefits of the SAED training program.

One of the project's early economic benefits would be realized from the reduction in the cost of services rendered to farmers by SAED and the incremental increase in the production of rice, tomatoes, and other products in the river valley as a result of training the farmers.

SAED provides a host of services, supplies, and equipment, to farmers for a price. These services include agricultural extension, credit, supplies of agricultural inputs (seeds, fertilizers, agricultural machinery,

etc.) and ground preparation services (plowing, threshing, clearing, seeding, fertilizing, spraying, and harvesting) Some of these services must be paid for directly by production groups.

Seeds, fertilizers, and other agricultural inputs and ground preparation services are supplied to farmers by SAED and repayments are deducted from the proceeds of sales of rice and tomatoes at harvest. Farmers sell their crops to SAED, except for those autoconsumed. Advances are made for six months or less and when repaid, a 15% charge is added for SAED's overhead.

The prices that SAED charges farmers for its services are relatively high because SAED's personnel are not trained adequately to perform these functions in an economically efficient manner and because farmers are not trained to perform the services themselves.

SAED's ground services are very expensive due to the high cost of maintenance and the rapid rate of depreciation of its machinery. Maintenance costs are high as a result of abuse of equipment by machine operators due to inadequate training in operating heavy equipment and because SAED's maintenance staff is not adequately trained in servicing heavy equipment. Consequently, we see standing in the yard of the garage at Ross Béthio expensive machines left idle because of a lack of spare parts or because SAED lacks trained mechanics capable of repairing them. This leads to a high rate of equipment downtime depreciation, the costs of which are passed on to the farmers in the form of increased charges.

Finally, SAED costs are high because machines are inefficiently used as a result of mediocre management and organization, from the Central Garage at Ross Béthio to the fields at the perimeter centers.

The integrated training program will serve to improve SAED's ability to render services to farmers and thus reduce the cost of these services.

Farmers will directly benefit from an integrative training program because it will prepare them to take control of the production directives which are currently provided by SAED.

The average farmer pays as much as 42,500 francs CFA to SAED to prepare land. As the farmer takes over these operations himself, his profits increase proportionately. The training program will also train farmers in animal traction which will allow them to cultivate their land with less use of heavy, sophisticated machinery.

The attached table summarizes the services and costs of an "average" farmer and the average returns that he realizes from cultivating one hectare of land under rice. During a normal crop year, a farmer can

Net Revenue to Farmers Per
Hectare of SAED-Improved Land in Rice
(In Francs CFA)

A. Costs Per Hectare

Plowing	8,000
Offset	5,000
	5,000
Seeding	<u>3,500</u>
	21,500
Seeds (100/kg/ha)	9,000
Fertilizer (200/kg/ha)	7,000
Irrigation (per ha.)	<u>25,000</u>
<u>Total</u>	<u>62,500</u>

B. Returns Per Hectare

5 tons @ 41,500 per ton	207,500
Net Revenue to Farmer Per Hectare	145,000

produce about five tons of rice per hectare of irrigated land. SAED currently pays 41,500 francs CFA per ton of rice paddy. This means that a farmer can earn 207,500 francs CFA per hectare. The farmer pays SAED about 21,500 francs CFA to prepare and seed a hectare of land and about 62,500 francs CFA for seeds, fertilizers and irrigation. Subtracting these costs, we derive a net revenue of 123,000 francs CFA per hectare of irrigated land under rice.

If the training program will prepare farmers to perform ground preparation, planting, and harvesting functions that are now provided by SAED, then total farmer incomes will increase by 2.4 billion francs CFA (\$9.6 million) assuming that SAED will reach its target rice production of 115,000 tons by 1980/81 as projected in its Development Plan. The benefits in one year will more than pay for the entire cost of the training program itself.

In spite of the high cost of services rendered by SAED, it is still unable to cover the costs of performing them from the proceeds of farmers. The cost of tractor and implement hire is subsidized at a rate of about 2,500 francs CFA per hectare. The substitution of some animal powered and hand cultivation through intensive training and more efficient management, distribution, and maintenance of heavy equipment will also save SAED money by reducing its current high overhead and operating costs.

The indirect benefits of education and training on other segments of the population cannot be readily measured in economic terms and are not therefore included in the above calculations of the benefits to the serviced group. These spread effects are expected to be substantial. Likewise, the social benefits deriving from increased literacy, more basic education, better health, social, and cultural services will be substantial for the farmer and his entire family.

A more detailed economic analysis will be carried out at the Project Paper stage.

Environmental Impact

The environmental effects which the development of the Senegal River Basin are likely to have will be thoroughly considered by the OMVS, partially with AID funding to consider the potential impact on health. Development of specific irrigated perimeters are themselves subject to complete environmental impact assessments during the design stages.

The direct impact of the SAED Training Project on the environment will be minimal. A relatively small land area will be affected or changed from its present state with no anticipated adverse effects. It is recommended that a threshold decision be made that the project will have no significant environmental effects and that an environmental assessment is not required.

VI. Other Donor Coordination

The OMVS regional program for the long range development of the Senegal River Basin has been recognized by the international community as one of the most important programs for the development of water resources in Africa. Because of this, and the relatively advanced state of planning for the program, it has obtained pledges of large scale financial assistance from a wide range of donors and international financial organizations. As an example, financing for the first major infrastructure project, the Diama Dam, in the estuary of the river, with an estimated cost of \$32 million is assured of financing from France and various Arab states. Final engineering studies are in progress and IFB's are to be launched in 1977.

Senegal has likewise been successful in obtaining financing for its program in developing irrigated perimeters within the framework of the OMVS master plan. Approximately 10,000 hectares exclusive of the sugar cane project at Richard Toll are currently under development. The major perimeters are Dagana, financed by the World Bank, Nianga funded by FED, and Boundoum which is being developed by the French. Several other projects are in the advanced development stage. At Matam, the French Caisse Centrale has recently agreed to finance 1,500 hectares in small perimeters modeled after the AID-sponsored Bakel project. Further financing from FAC is expected for an additional portion of this potential 10,000 hectare perimeter.

AID is expected to authorize \$4 million in the near future for up to 1,800 hectares in small perimeters at Bakel, and engineering studies are underway to determine the feasibility of AID financing for about 35,000 hectares under a Development Loan at Matam.

The World Bank has recently completed engineering studies for an overall program for 5,000 hectares in the Delta at Debi, Lampsar, and Diagambal. The total package is \$35 million with the Bank expected to provide about half with IDA funding. The Bank has asked AID to consider financing the 1,000 hectare tranche at Diagambal and this is currently projected in the FY 1978 budget in an amount of \$7 million.

Thus it is apparent that despite high initial capital investment costs, donors are convinced of the long term viability of irrigated agriculture in Senegal, and it is likewise true that these donors have a vital interest in seeing that an intensive training program is begun at the soonest possible date.

In specific connection with this PRP, the same World Bank studies mentioned above included the recommendation for the national irrigation center at Savoigne which is part of the SAED training program outlined in this PRP. Again the Bank requested that AID consider financing for this center in view of our emphasis on human resource development and training in connection with agricultural development.

In the preparation of this PRP, close coordination was maintained with several donor groups, particularly the Bank and FAC. The Bank provided two experts from its Senegal Education Appraisal team for a short period. FAC financed a study of requirements for a training program early in 1976, and this study by SATEC was made available to AID. The PID used material from this study, and it was taken into consideration by ORT in the development of the PRP.

At the time of the PID submission, the Dakar FAC office informed AID that it did not envision financing for such a program beyond the studies and perhaps some limited technical assistance. This situation has now changed, and at the invitation of the Bank, and with ADO/Dakar approval, the French were asked to participate in the PRP exercise. Two technicians, an agricultural engineer and training specialist spent a short time in Senegal during the period, and several meetings were held in Dakar between representatives of the IBRD, FAC, Caisse Centrale and AID.

At that time, the French announced that they were now planning a substantial financial contribution for the SAED training program and indicated a desire to work jointly with AID. Further, they indicated a planned involvement for a five year period, with financing for the first phase of two years tentatively set at up to 200 million CFA, equivalent to \$800,000. They likewise stated that a more detailed study would take place in early 1977, and it was decided that to the greatest extent possible, the AID Project Paper design work should take place at the same time with maximum collaboration between the two groups.

For the above reasons, the Financial Plan of the PRP sets out the total requirements to be financed by external assistance, but does not indicate what part will be specifically financed by AID. This will be determined at the PP stage in agreement with the French. It will also be decided at that time if IBRD will participate financially, or devote its resources solely to the development of the Debi and Lampsar perimeters.

For planning purposes, at the PRP stage, we are projecting AID financing of \$2.5 million over a five year period.

VII. FINANCIAL PLAN

A. SUMMARY OF TOTAL PROJECT COSTS +

(& 000)

	<u>FY78</u>	<u>FY79</u>	<u>FY80</u>	<u>FY81</u>	<u>FY82</u>	<u>TOTAL</u>
<u>Capital</u>	800	380	80	80	80	1,420
Const. Savoigne Center	550	-	-	-	-	550
Equip. Savoigne	50	150	-	-	-	200
Const. 4 perimeter centers	100	130	30	30	30	320
Equip. Ross-Bethio	50	50	50	50	50	250
Improve Nianga	50	50	-	-	-	100
<u>Technical Assistance</u>	250	240	240	240	240	1,210
3 expats.	225	225	225	225	225	1,125
Short term cons.	25	15	15	15	15	85
<u>Equipment</u>						
Vehicles, mobylettes, tractors	10	25	10	25	10	80
<u>Participant Trng. long and short range:</u>	25	30	30	30	30	145
<u>Functional Literacy Program</u>	10	10	10	10	10	50
<u>Evaluation</u>	-	-	30	-	30	60
<u>Contingency & Inflation</u>	274	171	100	96	100	741
TOTALS	1,369	856	500	481	500	3,706

B. GOVERNEMENT OF SENEGAL CONTRIBUTIONS

The GOS will be providing the land for the centers, personnel salaries while attending the training programs and for those who will manage the project, and other local costs estimated at dol.140,000 annually.

+ This is total project requirement to be financed by external assistance but does not indicate what part will be specifically financed by AID. The exact project components to be financed by AID will be specifically determined following the joint AID/FAC PP design mission.

VIII. IMPLEMENTATION SCHEDULE

- A. December, 1977: Project Agreement signed.
- B. Construction activities:
 - 1. Adopt final A&E-Specs for Savoigne Center: Feb. 1978.
 - 2. Order materials for four "secondary" centers and Nianga center: March, 1978.
- C. Technical Assistance: recruit three expatriates to arrive in Dakar for orientation by mid-January, 1978. This requires anticipating the ProAg and identifying candidates as early as September, 1977.
- D. Equipment at Ross Bethio, Machinery Maintenance Center: lists and procurement orders for equipment should be ready within three months after arrival of the expatriate advisor.
- E. Assuming that job descriptions of all trainees will have been prepared in early spring or as soon as possible after ProAg signing, SAED-personnel trainees can be selected for opening sessions of sub-centers approximately in August; these sessions would begin in September or October of 1978.
- F. Selection of the Farm-leader trainees, to attend the first session of the Nianga Center under the revised curriculum should be completed by June, 1978. This will permit training to begin in the improved facilities in July or August, 1978.
- G. Completion of construction for and curriculum of the Savoigne Center, as well as recruitment of staff and trainees, is targeted for March, 1979. The first sessions would begin in April.
- H. During FY80, e.g., the spring of 1980, the first full-scale evaluation of project activities will be conducted.

IX. PROJECT DEVELOPMENT SCHEDULE

PRP submitted to AID/W	November 30, 1976
PRP reviewed and approved	January 31, 1977
PP design requirements determined and team identified and recruited	March 31, 1977
PP design	April 15-June 15, 1977
PP reviewed and approved	August 30, 1977
Project authorized	October 15, 1977
ProAg signed	November 15, 1977
Project implementation begins	November 15, 1977

PROJECT LOGICAL FRAMEWORK

Life of Project:
 From FY 1978 to FY
 Total US Funding 2,675
 Date Prepared Dec.1, 1976

Page 4

Project Title and Number SAED Training 685-0218

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs (D-1):</p> <ul style="list-style-type: none"> - Construction and equipment for Savoigne Irrigation Technology center. - Construction of four perimeter centers. - Improve Nianga center as, (a) a fifth "secondary" and (b) the farm-leader training center. - Equipment for central machinery maintenance center, Ross Bethio. - Technical assistance, 3 expatriates: Agric. Tech; Agric. Educator; Mechanics Trainer. Also, advisory services and materials for management seminars. - Counterparts: Participant training. - Project evaluation. 	<p>Implementation Target (Type and Quantity) (D-2):</p> <ul style="list-style-type: none"> - Construction and capital equipment: Savoigne center, five perimeter centers, Nianga (as farmer-leader training center), Ross Bethio maintenance center: - Technical assistance: 3 expatriates, management seminars: - Participant training: - Evaluation of project; - Vehicles, tractors, mobilettes. 	<p>(D-3):</p> <p>ProAg and SAED records reflecting obligations and expenditures.</p>	<p>Assumptions for Providing Inputs (D-4):</p> <p>AID approves funds to the level requested.</p>

PROJECT LOGICAL FRAMEWORK

Life of Project:
From FY 1978 to FY _____
Total US Funding 2,675
Date Prepared Dec. 1, 1976

Project Title and Number SAED Training 685-0218

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs (C-1):</p> <ul style="list-style-type: none"> - Farm leaders trained in cooperative management and capable of training other farmers. - A more skilled farm population capable of irrigated cultivation and use of animal traction. Such capacities would tend toward an economically more autonomous and participatory population, contributing to and concerned about development. - Curricula designed for trainers. - A SAED more sensitive to training needs and to socio-economic constraints. - SAED staff trained in administrative, office and technical skills. - Extension agents more informed and more effective. 	<p>Magnitude of Outputs (C-2):</p> <ul style="list-style-type: none"> - 309 SAED Extension workers trained. - 625 SAED pers. (top management and other levels) trained. - 5 SAED pers. received U.S. long-term training. - 15 SAED pers. received U.S. short-term training. - 870 village chiefs trained or upgraded. - 60,000 villagers to be trained by the chiefs. - 23,500 persons received functional literacy training. - Savoigne training center completed. - Four small perimeter centers completed. - Ross Bethio and Nianga centers refurbished and equipped. 	<p>(C-3):</p> <ul style="list-style-type: none"> - Project evaluation reports. - SAED reports and records of personnel attending training programs. - Physical inspection of buildings and centers. 	<p>Assumptions for achieving outputs (C-4):</p> <p>SAED personnel and farmers are willing to attend the training programs.</p>

PROJECT LOGICAL FRAMEWORK

Life of Project: . . .
From FY 1978 to FY . . .
Total US Funding 2,675 . . .
Date Prepared Dec. 1, 1976

Project Title and Number SAED Training 685-0218

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal. The broader objective to which this paper contributes: (A-1)</p> <p>To improve agricultural practices in the Senegal River Basin and increase production.</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>Increased agricultural output in the Senegal River Valley of rice and vegetables is attributable to the project.</p>	<p>(A-3)</p> <p>National accounts, SAED records.</p>	<p>Assumptions for Achieving Goal Targets: (A-4)</p> <p>GOS continues to be interested in expanding agricultural production in the Senegal River Valley.</p>

PROJECT LOGICAL FRAMEWORK

Life of Project:

From FY 1978 to FY

Total US Funding 2,675

Date Prepared Dec. 1, 1976

Project Title and Number SAED Training 685-0218

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose (B-1):</p> <p>To assist SAED (the agricultural extension agency operating in Senegal in the Senegal River Basin) to develop a training program for upgrading the skills of its personnel.</p>	<p>Conditions that will indicate purpose has been achieved. End-of-Project status (B-2):</p> <ul style="list-style-type: none"> - Increased individual and perimeter productivity. - Increase on grain and vegetable outputs from SAED-developed lands. - Increased personal and community income. 	<p>(B-3)</p> <ul style="list-style-type: none"> - SAED's training programs - Annual work plan - Evaluation reports 	<p>Assumptions for achieving purpose (B-4):</p> <p>SAED's policy continues favor the up-grading of personnel.</p>

AN INTEGRATED TRAINING PROGRAM
FOR SAED PERSONNEL AND
THE FARMING POPULATION OF THE DELTA REGION
AND SENEGAL RIVER VALLEY

ORT
Geneva

September, 1976

(Translation)

SUMMARY AND CONCLUSIONS

The Society for the Planning and Management of the Delta Region of Senegal (SAED) is an intervention agency, assigned by the Government of Senegal to study, organize and promote the rural development of the delta region and the Senegal River Valley.

Under this heading, it has been given the following objectives:

- to develop water resources the Delta Region and Valley for the irrigation of crops;
- to ensure the farming and administration of these improvements, grouped by region into operational units called Perimeters;
- to mobilize the rural population in order to assure, in whole or in part, the cultivation of crops on the perimeters;
- to regroup the farmers into socio-professional associations, (Groupements de Producteurs), and to train them so that they can undertake and ensure the farming and administration of the perimeters.
- to increase from 10,000 ha in 1976 to approximately 50,000 ha in 1985 the area under cultivation.

To reach these goals, SAED will employ a large staff; its personnel increasing from its present 600 to more than 1,100 in 1985.

Given, Senegal's present available manpower resources, this recruitment poses various qualitative problems. Trainers in various professions are hard to find and their capabilities to train is low. For this reason SAED set-up, in 1973, an internal training program designed first for the farmers and secondly for the personnel of the society. The success of this operation has encouraged SAED to plan a vast integrated training program.

The project's goals are:

- to increase the present training potential of farmers in order to accelerate the undertaking of farming and administration by the Groupements de Producteurs;
- to improve, in a tangible and durable fashion, the professional and technical capacity of the officials and personnel of SAED;
- to develop a sense of human interaction in order to improve relationships and to create a climate of confidence between SAED and the farmers;

- to lessen the costs of farming the perimeters, thereby increasing the returns to the farmers, through better utilization and maintenance of material and machines due to the improved capabilities of responsible personnel;
- in a general manner, to increase the productivity of SAED.

In order to succeed, a vast training and improvement program for the farmers and the whole of management, administrative and guidance personnel will have to be instituted. In most cases, the idea of "on the job" training will be adhered to, the exception to the rule being the training of administrative and technical personnel of SAED who will receive a more traditional type of training. The education of the teachers will have a multiplier effect in all areas.

The realization of this project will require, in addition to present personnel, 3 expatriates and 29 teachers, technicians and varied specialists, several of whom will come from the offices and services of the SAED, and will work only part-time with the project.

The project will be divided into three sections:

- the training of farmers leaders and farmers as a whole;
- training and further education of the administrators, technicians and employees of SAED;
- training and further education of management and administrative personnel of SAED.

The training of farmers leaders, the future heads of the Groupement de Producteurs, will take place at the Centre de Perfectionnement Agricole de Nianga, whose training capacity will be increased.

The training of the rest of the farmers will be a result of an increase in SAED manpower and resources. It will continue to take place in the villages and the field.

The training of the administrators, technicians and employees who will work at the farm level will take place at the Centre National de Formation aux Techniques d'Irrigation, and introduced into the framework of the project at Savoigne. The training and further education of management and administrative personnel will take place on the job, thereby providing a certain amount of productivity.

The project will be spread out over a period of five years after which it will become the full responsibility of SAED. The first year, will be devoted to building, program study and recruitment of Senegalese project administrators and the first trainees. During the following three years the Senegalese teaching personnel will be trained and further educated in Senegal as well as in other African countries with adequate facilities. Permanent contact and seminars with SAED services will facilitate the evaluation of the course and development of the project throughout its A progressive takeover of responsibility by the personnel of the SAED will begin at the end of the third year.

CHAPTER I - INTRODUCTION

A special mission conducted by Mr. Simon Feldman and Mr. Vittorio Pavoncello, who are respectively the under Director of O.R.T.'s Department of Technical Assistance in Geneva, and the Technical Coordinator of Programming, came to Senegal in November 1975 to study training needs of developing projects. During their stay in Senegal, they especially noticed the training requirements of SAED.

From July 16 to July 31, and from September 17 to October 5, 1976, Mr. Michael Hausser, agronomist, was appointed by O.R.T. Geneva, to carry out two evaluation missions on SAED's training needs for their development projects, both at Saint Louis, Senegal, and in the Senegal River Valley. During the two trips, he was able to meet with those in charge of the Societe both at headquarters, as well as in the field.

The present report, written in Geneva in collaboration with the technical and pedagogical services of O.R.T., is designed for U.S.A.I.D., Dakar, in anticipation of the drafting of an internal document (P.R.P.). It has been drawn up along the lines of O.R.T.'s diagram type report.

We would like to express all of our thanks for the help given to us by everyone we met in the course of these missions and, in particular, to Mr. C. Cissoko, General Director, and Mr. Oumar Ba, Director of the Atelier de Formation of SAED.

CHAPTER II - PRESENT SITUATION AND STRUCTURE

A. Present situation

The Society for the Planning and Management of the Delta Region is a public industrial and commercial concern. Created in 1965 by the Government of Senegal, its objective is the development of the ecologically homogeneous region in the Senegal River Delta.

In this regard, SAED is responsible for the study, planning, and management of the irrigated land in the Administrative Region of the Fleuve, Senegal, and along the length of the Senegal River Valley.

Once the land development has been accomplished, SAED will regroup the farmers into socio-professional organizations and train them to enable them to taking over the farming and administration of the lands.

Presently, close to 10,000 hectares are under cultivation. SAED has the intention of developing close to 50,000 hectares with integral water control by 1985.

The dimensions and diversity of this vast regional development program requires the necessary administrative, technical and working personnel as well as material.

Along with personnel in charge of land development and management, a closely-knit administrative infrastructure has to exist in order to ensure an effective method of transmitting technical data to the farmers and for controlling the implementation.

The experience acquired by SAED throughout the last decade has caused it to redefine the whole of its operations. Thus, taking into account climatic risks, the irrigation system has been overhauled to permit integral water control at the level of each plot of land.

Since the level of technicality has greatly increased, the farmer's adjustment to the new techniques has become more difficult, and even the level of knowledge of the administrators personnel of SAED has proven inadequate.

SAED, anxious to achieve its goals, has expressed the desire to develop an integrated training program for all of the farmers and its own personnel.

B. Structural Operation

i. The Structure of SAED

The SAED is directed by a General Director located in Saint Louis. He is directly assisted by a Secretary General, and Secretary General Assistant.

The General Directorship relies on the Office of Study and Programming for research work and studies necessary to SAED. This office is composed of five workshops:

- Land development: in charge of studies and topographical investigation;
- agro-economics: in charge of the study and evaluation of projects;
- training: in charge of determining training programs at different levels; responsible for the conception and choice of pedagogical material in accordance with SAED's goals;
- agricultural mechanization: in charge of studying technical means to implement farming techniques;
- economics: in charge of studying the farming results of SAED.

The Accounting Office ensures the management of different accounts (general, analytic, budget), as well as the supplying of office supplies, motor fuel, and lubricants.

There are four divisions with defined functions:

- Administrative and Commercial Division: ensures the management of personnel; guidance and the recovery of farmer's debts and the commercialization of products.
- Industrial Division: ensures the maintenance of the appliance unit and agriculture machinery, the supply of parts and the functioning of the rice processing plants.

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- Planning division: ensures the realization of land development as well as the maintenance of irrigation networks and buildings.

Each plot of land makes use of one irrigation network and pump installation, in accordance with the type of development used. In addition, it makes use of heavy equipment (trucks, tractors, and agricultural machinery), whose sizes vary according to the size of area to be developed. (see annexed inventory).

SAED realizes that the use of large and heavy machinery entails high farming and production costs. It has also ascertained that the farmers have adopted a passive role in relation to the machines. These findings have lead the Society to review its operational approach and to plan on the use of simpler perimeter development in the Valley, worked on by the farmers themselves. A study along these lines by the SCET INT. has been started to establish a new master plan.

The present size of SAED and its large-scale program compell the Society to recruit significant numbers of personnel. There are presently 736 employees and this number will be increased to 1,300 by 1985. The magnitude of this recruitment will have repercussions on the quality of the personnel.

A Perimeter Coordinator ensures the liaison between the General Directorship and the different perimeters.

These represent the operational units of the SAED. All of the development is grouped into 6 principal perimeters: Delta, Nianga, Dagna, Guede, Matam, Bakel

SAED plans on giving as much autonomy as possible to the perimeters who will use their own structure of management, administration and planning.

2. The Scope of the SAED Operational Program

The geographic region involved in SAED's operations extends from the Senegal River Delta to Bakel. Administrative-ly, it comprises the Fleuve Region and the communities of Matam, Bakel and Olodou.

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The total population of this area is about 512,000 persons, with 8,4 inhabitants per km2.

Ninety-three per cent of the population works in the rural domain (agriculture, fishing, breeding).

According to IBRD estimates, there exists in the Fleuve Region alone, close to 31,000 farms which equals the use of 150,000 ha. of land.

According to the SCET INT. study, the farmers income, using traditional methods, varies between 20 000 francs CFA and 35 000 francs CFA depending on the choice of crop.

The average income of the farmers, when farming plots of land which are set up within irrigation networks, and managed by SAED, comes to 80 000 francs CFA during a normal year.

3. Main Ethnic groups represented

The two main ethnic groups of the region are the Toucouleurs and Woloffs. According to the statistics of the SCET INT. in 1975 the Toucouleurs represent 62% of the population, and the Woloffs 25%. These two groups are involved in agriculture and fishing. Livestock is a developing trend in the region.

4. Current operations

4. 1. Structure and Role of the training workshop

The training workshop is one of 5 workshops with in SA ED's Office of Study and Programming.

Run by a Division Chief located at Saint-Louis, it is composed of the following 3 divisions:

a) Audio-Visual Division

This division assists in the training of the administration of SAED, it is directed by an Engineer of Agricultural Work (ITA). It produces audio-visual programs. The material is almost totally produced locally, and therefore linked to the local situation.

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This division is equipped with a mobile projection and sound unit furnished by the Society ^{for} Irano-Senegalese Cooperation.

b) Literacy Division

This division works with the Audio-visual section, and brings to it a written vitalization and training element. The operation of this division adds to the training of the farmers and their wives through literacy programs. Under the supervision of an ITA, this division comprises a literacy team, which has received specialized training.

c) Cooperative Division

This section is headed by an Inspector of Cooperatives Supervisor who is assisted by an administrator. The two directors work out of Saint-Louis and from there manage the regions of the SAED. This division promotes the creation of "groupements de producteurs" and Development Cooperatives. This division, administrating cooperative education, completes the structure of the training division.

4. 2. Structure of Perimeter Management

The head of the Perimeter, an Agronomist or ITA, is directly responsible for the dissemination of information on the perimeters. He is answerable to the Perimeter Coordinator and has assistants who are themselves responsible for Administrative teams.

Presently, the assistant manager with by 5 to 10 assistants is responsible for 1,500 ha.

The managerial assistants are in charge of the follow-up of information operations and the transmission of these ideas to the technical and managerial administrators.

There are 27 managerial assistant posts. This number should increase to 40 by 1984.

The regional chiefs are responsible for 500 ha.

An Assistant is responsible for 3 to 6 "Groupements de Producteurs", or in other words, 100 to 150 ha. He is the relay between the farmers and SAED. There are presently 84 assistants. This number will increase to 197 by 1984. The guidance counselors are in general former assistants. There are in charge of counseling and helping the "Groupements de Producteurs" with their farming problems. Each counselor is responsible for 2 or 3 "Groupements". Theoretically, he should be answerable to 1 or 2 cooperative supervisors per Perimeter though this has not yet been accomplished.

4. 3. Perimeter Level Operations

At each perimeter level, the training should be undertaken by extension personnel. An Educational Center will be established within each perimeter. Until now, only the Dagana Center is operational. Each of these centers would be composed of 3 persons coming from the above mentioned 3 divisions. They will be in charge of the training and further education of certain categories of SAED perimeter personnel, and above all, the training of the farmers involved in SAED projects. Consequently, there will be wide-range action by the training workshop.

Training of Farmers at Nianga

This type of training, advocated by SAED, completely satisfies local needs. It takes place in 3 distinct phases: sensitization, dissemination of information and apprenticeship.

The Agents in charge decide on a sensitization subject, for example the cultivation of rice. This subject is then introduced into the farming environment through the help of the audio-visual division.

The dissemination of information which follows is discussed and commented on, (for example planting in rows), and then subject to demonstration. The apprenticeship phase then follows, that is the farmer becomes a performer.

This method, which gives excellent results, has become widespread within the regional rural development agencies.

The literacy program, in local language, reinforces this operation. It is necessary not only to learn, to read and write but also to accomplish this apprenticeship within the rural development setting. Thus, this phase begins with a technical theme (dissemination of information) the slogan of which is alphabetically analysed and studied. The first experiments in this area by the training workshop has provided very interesting and excellent results.

The operation of the training workshop supports, in a traditional way, the extension operation. It is important to emphasize that the activities of learning must go beyond the simple transmission of a technical data and the control of its implementation. The training must help the extension agent to become the farmer's advisor.

4. 4. Agricultural Training Center

In order to extend the training operation to the heart of the "Groupement de Producteurs". SAED has solicited the assistance of B.I.T. for the study and introduction of a center designed for the professional training of selected farmers, future chiefs of "Groupement de Producteurs". This Center, located on the new perimeter of Nianga, receives farmers chosen by the Groupement de Producteurs for an 11-month training program.

They will be thoroughly trained in the different irrigation techniques and the crops which these techniques make possible. Equally, they will receive a general agricultural training permitting them to improve all of the regional crops. They will also learn about animal traction. Through this acquired knowledge, they will acquire themselves the profile of trainer and animator, thus lightening the load of the SAED personnel.

There are presently 267 Groupements de Producteurs; this number should increase to 870 by 1985. It is precisely these "Groupements de Producteurs" that will take over the irrigated perimeters, until now controlled by SAED, once they have acquired the necessary farming skills, irrigation techniques, and cooperative organizations.

Each group will be composed of 15 to 20 families. This project will have repercussions on the production potential and quality of life of close to 19,000 families.

The Nianga Center of Agricultural Improvement created by the B.I.T. , under the supervision of the Secretary of State for Promotion Humaine, is in charge of training select farmers. Chosen by the villages and the Groupement de Producteurs, they follow an 11-month training program in irrigated cultivation techniques. The infrastructure permits the reception of 56 trainees. The training follows a methodical sequence: Theoretical instruction of a chosen topic, practical application of acquired knowledge, and field work.

The instructor initiates a dialogue with the students on a chosen training topic. He assists the trainees to discover and acquire new knowledge.

The instructor puts into practice the chosen topic and explains each operation, putting emphasis on farming.

The students carry out the operation, first individually and then in groups, under the control and supervision of the instructor. This phase is carried out in the field.

Remarks

The two methods of training follow the 5 steps outlined below:

- observation in the field;
- observation using a lay model;
- discussion of the format, practice in artificial surroundings;
- practice in the field.

The practical approach to this training should be retained. The utilization of demonstration constitutes the basis of the operation.

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Along these lines it is useful to underline the farmer's personality, a simple and concrete man who believes only in what he sees, which explains the emphasis on demonstration within the training program.

4.5. Small Perimeters

The development of small perimeters is linked in part to the training of the farmers: they are in effect, small perimeters outfitted by the farmers themselves, according to the advice given by the personnel of SAED. The farmers learn, at their own rate, how to execute different perimeters, water control, and maintenance of crops. It is interesting to note that the credit system has not yet been instituted at this level, but cash payment for all material, equipment and products has not yet become a problem).

The small perimeters should henceforth constitute the first level of SAED intervention in new regions. A plan under study would consist in finding other intermediate size perimeters and rapidly leave the control and management to the Groupements de Producteurs. In this type of operation, the integration of SAED personnel into the rural domain is very important because from the start it should be a development operation accomplished by the farmers themselves.

5. Different Types of Land Preparation

5. 1. Primary Preparation

The first type is extremely simple. It consists of protecting the swollen water basins by constructing dikes. These dikes are equipped with flood gates to permit or prevent the access of water into the basins. There are no other fittings. Rain water suffice for plant germination, the flood gate being used only during flood periods. Three thousand ha. are already equipped in this manner.

5. 2. Secondary Preparation

By internal within the cuvettes, one obtains this type of land preparation. Different points in the cuvettes are linked together by canals which permit rapid emptying or filling of the rice fields.

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Nevertheless, they will remain very dependent on climatic factors. This type of development could be improved if pumping stations are annexed. If flood waters are in sufficient, the pumping stations could make up the deficit.

5.3 Tertiary Preparation

The hydraulic network is set-up in such a manner that each plot of land can be irrigated or emptied in an autonomous fashion. By the creation of complete networks of canal irrigation and drainage, one can obtain integral water control. It then becomes possible to control the water deficit due to insufficient rainfall and from there the deficit along the river. All of the canals are linked to pumping stations.

CHAPTER III - TRAINING NEEDS

A. Analysis of the present situation

Taking into account the primary goals of the SAED, and the situation which exists in the agency, imperative training needs are manifested in all areas.

The farmers are the most concerned parties in a professional training program. If the structures established to this effect by the training workshop are effective, the requirements are small due to the fact that the workshop is not active at the level of Ross-Bethio and Delta Perimeter. The creation of Centers of Secondary Training in each perimeter will have a multiplier effect but taking in account the intended numbers, this effect will be small.

The Nianga Center for Agricultural Improvement presently undertakes the training of the future chiefs of the Groupement des Producteurs. If the program and methods of training are successful, nevertheless, the capacity of this remains small in relation to the enormous needs of SAED.

It is essential to ensure an infrastructure for professional farmer training which is sufficiently substantial in order to accomplish the training of all the chiefs of Groupements de Producteurs in such a way as to multiply, inside the group, the administrative training of the rural population.

The administrative personnel of the perimeters have been, until now, confined to the role of disseminating information and controlling its implementation. They have not had the capacity to train and for animation which is essential to its functions.

Recruitment standards for administrative personnel are mixed. It is only since 1974 that the standards have been regularized (Agents Techniques d'Horticulture).

This lack of uniformity, added to a lack of understanding of the role of the administrator, has complicated the maintenance of relationships that must exist among the rural population.

The officer, the various technicians, and administrative personnel are not sufficiently informed about the various irrigation techniques. Senegal does not have training programs specialized in this area.

On the whole, the personnel of the SAED do not sufficiently understand the organization, goals, and functioning of the Society. This means that the various employees are not able to place themselves properly within SAED. This results in a lack of coordination and hinders the smooth running of operational programs.

There are no personnel specialized in the maintenance and repair of pumping stations on the perimeters; they are, therefore, dependent on the central office at Ross-Bethio. It is easy to imagine the difficulty that this engenders.

There is little real organization of personnel at the Central Office. Parking for trucks, vehicles and machines is complicated. Few mechanics are really qualified for or specialized in the work to be done. There is a need for complementary training.

It is the same for the drivers of trucks, tractors and other machinery. There are large maintenance and repair costs, as well as difficulty in following the agricultural work schedule. This has repercussions directly on the farmer; farming costs are high and they are attached to the producers budget.

At the implementation level, there is a lack of knowledge about the needs of the various sectors. Here again there are repercussions on project operations (lack of grain, fertilizer, and spare parts when needed).

In general and on all levels of responsibility, a lack of organizational and management training is apparent.

There are no job descriptions defining in a concise manner the duties of each branch of the Society.

B. Proposed perimeter development by SAED

(See chart No. 1.)

B. Operations of SAED(surface area in hectares) - (Document Source: SAED) 1976-85

Perimeters Years	1976-1977	1977-1978	1978-1979	1979-1980	1980-1981	1981-1982	1982-1983	1983-1984	1984-1985
Delta	5,200	+ 3,550	+ 2.500	+ 2.000	-	-	-	-	-
Angana	2.700	+ 900	+ 1.400	+ 1.500	+ 2.000	-	-	-	-
Anga	750	-	-	+ 800	+ 450	-	-	-	-
Mede	200	-	+ 150	+ 1.200	+ 1.600	+ 3.600	+ 300	+ 1.150	+ 3.000
Atam	200	+ 100	+ 1.300	+ 300	+ 1.300	+ 1.000	+ 1.000	+ 1.000	-
Kel	100	+ 200	+ 700	+ 900	+ 300	+ 1.500	+ 5.000	-	-
Total/year	10.170 Ha	+ 4.750	+ 6.050	+ 6.700	+ 5.650	+ 6.100	+ 6.300	+ 2.150	+ 3.000

1. Equipment, Material, Trucks

1.1 Present equipment

Presently SAED has at its disposal:

- at Ross-Bethio: one rice processing plant with a 7 T/h processing capacity, one low tension electricla plant of 300 KWA, one silo.
- at Richard-Toll: one rice processing plant with a 4 T/h processing capacity, one high tension electrical plant of 400 KWA, one silo.

These two units are attached to the Industrial Division, which will soon be divided into a rice processing division and a workshop division.

The Industrial Division is responsible for the management and maintenance of the rice processing plant. In addition it controls the offices at Ross-Bethio and at Richard-Toll which are presently being activated. At Ross-Bethio and Richard-Toll, there are two stores of stock material for the farming needs of the perimeters and for the functioning of SAED's material depot. The re-opening of Richard-Toll permits the lessening of the burden of Ross-Bethio and decreases the distances which separate the main offices and stock from the operational centers.

For the development and farming of the irrigated perimeters, SAED has at its disposal a large quantity of material divided between Ross-Bethio and the other operational centers. (See annexed list). The present equipment can be summed up as follows:

Outfitting Division:

- 2 D6 bulldozers
- 2 D5 bulldozers
- 2 tractors drawn scrapers
- 1 12F leveller
- 1 14G leveller
- 1 steam shovel on wheels

- 3 613 moto scrapers
- 3 land-planes
- 2 Massey-Fergusson tractors and trucks
- 2 lubricating trailers.

It must be pointed out that this unit will increase due to the fact that the SAED has its own service of rural engineers and thus will no longer need the help of private entrepreneurs.

Divided between Ross-Bethio and various perimeters, the trucks and agricultural material can be summed up in this way:

- 87 wheel and caterpillar tractors, with all the farming material: ploughs, grinders, offsets, power rollers, seeder-harvester-threshers, trailers, etc.
- 14 trucks
- 66 light cars
- A main pumping stations with diesel moto-pumps and generating sets
- 3 electrical centers (high and low tension of 50-3000 KVA
- 65 mobile moto-pump sets
- maintenance, draining, and lubrication trailers.

The above mentioned material does not function to full capacity primarily because of a lack of trained personnel in charge of its utilization and maintenance. In addition the structure of the unit at the distant perimeter level (Nianga, Dagana, and Guede) has too few men and too little material, which necessitates the team at Ross-Bethio either to move about or to bring the vehicles into the central garage.

1.2 Estimation of Equipment of a tertiary set-up of 1,000 hectares

This estimate is the result of a report by SCET Int. and comments by those responsible for operations in the field.

- 5 wheel tractors of 45 to 80 horsepower (Fiat, Massy-Fergusson),
- 3 disk drawn or half-drawn ploughs (McCormick)
- 1 lorry
- 1 drainage and lubrication station
- 2 8,000 to 10,000 liter motor-fuel tanks
- 1 vehicle for the administration
- 404 Peugeot Pick-up for farming counseling
- 3 offsets
- 3 floats
- 4 threshers
- 2 14 row seeders
- 2 trailers
- 2/3 pumping stations ensuring a unitary volume of 10,000 m³/h (one station usually comprises four pumps) (one to two mobile motorpump sets).

1.3. Estimate of personnel requirements for the development of 1,000 hectares.

Heavy Equipment drivers	5
Mechanics	1
Mechanics aid	2
Maintenance men for pumping stations	2
Maintenance men for irrigation network	1 (2)
Terracing specialist	1
Extension agent	3
Chauffeur	1

Twenty producer groups, including about 300 families, will develop the 1,000 hectares, one producer group being able to develop about 50 hectares. The estimates of the maximum number of extension and development personnel required by SAED from now to 1985 is estimated as follows:

Perimeter Chief	1 for 3-7,000 ha.
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Chief of Project	1 for 3-7,000 ha.
Assistant Manager	1 for 3-7,000 ha.
Extension agent	1 for 315 ha.
Assistant Extension agent	1 for 1,650 ha.
Equipment Operator	1 for 260 ha.
Mechanic	1 for 356 ha.
Maintenance man for irrigation network	1 for 885 ha.
Manager of terraces	1 for 1,060
Maintenance man for pumping station	1 for 1,050 ha.

The need in equipment and personnel cited above are a part of a global estimate for the development of large perimeters. It is necessary to note, however, the actual situation of SAED cadre to better understand their requirements, the possible options for future perimeter development and their effect on manpower needs.

The main goal of the SAED being the transmittal of land improvement to the Groupement de Producteurs, a number of facts have reduced the optimism of some administrators of the SAED:

1. Farming costs of tertiary set-ups (large perimeters) in intensive mechanized culture are extremely high and heavily burden the farmer income.

2. The use of highly-mechanized culture decreases farmer motivation. This leads to a lack of interest that works against the priority goals of the SAED.

3. While it is true that some types of soils in the Valley and Delta are too heavy to be cultivated other than by mechanization, the basins belt can often be worked by the farmers using animal traction. The introduction of some cultural practices using animal traction has started in many places and appears to be successful.

4. Simpler land development and at a smaller scope can be entirely taken care of by farmers from the start. This has been proven at Matam and Bakel where the producer groups end the agricultural campaign with a minimum or a total absence of debts. In their operations SAED personnel are far less necessary since they are practically limited to a guidance role.

It is precisely through studying this situation that the concept of light mechanized units, cared for by the farmers, has been planned and is being tested in different locations, particularly at Dagana.

A mechanized unit would only intervene on an irrigated perimeter of the scale of 50 ha. farmed by a Groupement de Producteurs. After the training of personnel in charge, drivers, maintenance mechanics, it would be totally taken over by the rural socio-professional structure.

The mechanized unit would have the following material:

- One 40-hp tractor
- One plough with reversible discs
- One 18-disc offset
- One 3.5-ton trailer
- One 14-row seeder
- One fertilizer distributor

This solution, intermediary between large and small perimeters, is much more acceptable to farmers. Farming using animal traction exclusively will be developed wherever possible.

The SAED training action bears a considerable and imperative importance, more or less pronounced in the three solutions. This is the main reason for the search of a training action integrated by the Society.

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Table of Personnel to be Trained and Improved

<u>Personnel</u>	<u>Actual Personnel to Improve</u>	<u>New Personnel to Train During Project</u>	<u>New Personnel to Train Up to 1985</u>	<u>Total to Train and Improve</u>	
				<u>1977-82</u>	<u>1977-85</u>
<u>Officers</u> (BEP agents and Depts. responsible for agronomy and production, heads of project perimeters)	55	6	81	61	63
<u>Technician Personnel</u>					
Topographers	26	4	5	30	31
Sketchers	9	4	4	13	13
Investigators	27	12	17	39	44
Pedologists	26	7	7	33	33
	<u>88</u>	<u>27</u>	<u>33</u>	<u>115</u>	<u>121</u>
<u>Guidance Personnel</u>					
Responsible personnel for guidance	27	17	23	44	50
Guidance agents	84	85	113	169	197
Administrative officers	20	9	11	29	31
	<u>131</u>	<u>111</u>	<u>147</u>	<u>242</u>	<u>278</u>
<u>Administration, Management Personnel</u>					
Assistants to administrative officers	6	6	6	12	12
Stock-keeper	10	5	8	15	18
Accountants	30	15	15	45	45
Administrative clerks	25	10	10	35	35
Secretaries	36	8	10	44	48
	<u>107</u>	<u>34</u>	<u>49</u>	<u>151</u>	<u>118</u>
<u>Mechanical Works Personnel</u>					
Heads of team	10	2	2	12	12
Machine-minders	80	22	22	102	102
Drivers LW and HW	70	12	12	82	82
	<u>107</u>	<u>36</u>	<u>36</u>	<u>196</u>	<u>196</u>

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<u>Personnel</u>	<u>Actual Personnel to Improve</u>	<u>New Personnel to Train During Project</u>	<u>New Personnel to Train Up to 1985</u>	<u>Total to Train and Improve 1977-82 1977-85</u>	
<u>General Mechanic Main- tenance Personnel</u>					
Mechanics (central workshop)	6	6	12	12	12
Mechanics (perimeters)	30	19	49	49	49
Mechanics (intervention)	6	6	12	12	12
Welders - panel beaters	4	4	8	8	8
Turners - Adjusters	3	2	5	5	5
Mechanics (maintenance)	3	2	5	5	5
	<u>52</u>	<u>39</u>	<u>91</u>	<u>91</u>	<u>91</u>
<u>Gas Station Personnel</u>	2	2	-	-	-
<u>Auto-Diesel Mechanic Personnel</u>					
Mechanics (engines)	18	10	10	28	28
Mechanics (pumping stations)	16	12	12	28	28
Mechanics (cars)	11	10	10	21	21
Mechanics (agricultural machinery)	8	8	8	16	16
	<u>53</u>	<u>40</u>	<u>40</u>	<u>93</u>	<u>93</u>
<u>Electricity Personnel</u>					
Electricians (central and group)	15	9	9	24	24
Electricians (engines and cars)	5	5	5	10	10
Electricians (perimeters)	5	5	5	10	10
	<u>25</u>	<u>19</u>	<u>19</u>	<u>44</u>	<u>44</u>

N.B. Numbers are only estimated for the present as well as for the future. Data collected on the spot during July and September missions lead to different results. In evaluating personnel needs, the take-over of set-ups by Groups of Producers is not accounted for. It is in fact impossible to determine the rate of this take-over. This is then a maximum estimate of personnel.

Proposed Project Goals

The purpose is to realize an integrated training program for rural population within a development framework of SAED, and at the same time to train all of SAED personnel.

This project focuses on these separate sections:

1. Training of farmers
2. Training and improvement of officers and technicians of SAED
3. Training and improvement of field workers and maintenance, administration and management personnel of SAED

a. Training of farmers: The training structures set up by SAED are quite good but too modest to enable it to reach its goals. It becomes a question of reinforcing the existing base through two means:

- The effective creation of secondary training centers at perimeter level

- The reinforcement of infrastructure and training at the Agricultural Improvement Center of Nianga destined for selected farmers, future chiefs and instructors of producer groups.

b. Training and improvement of officers, technicians and guidance agents of SAED: This section of the project deals with the specific training of officers, technicians and guidance agents in irrigation techniques. Since there is no such training infrastructure in Senegal, the construction of such a center is planned. Considering SAED goals, the purpose of this section of the integrated training project aims at giving SAED personnel an educator's profile, so as to enable them not only to transmit but also to teach cultural practices.

c. Training and improvement of personnel for farming, maintenance, administration and management of SAED: The third section of the project deals mainly with executives. It is a question of assuring some homogeneity to each category of personnel. The real level of professional training is general-16 low and unequal within the same department.

One ought to not only train or improve all of SAED personnel, but also assure an educator's profile to administrators of various departments (in particular farming and maintenance) so as to increase the program efficiency by a multiplier effect of permanent training.

On the whole, the integrated training project will have a general and important complementary goal. It should enable each employee to better integrate himself into SAED and its development program, and thus better contribute to the realization of SAED's goals.

Project Impact and Possible Extension

1. Impact on rural population

The direct beneficiaries of the training effort will be the rural population. The training of heads of farmer groups, the rural training in villages and the new dimensions given SAED personnel will accrue to some 19,000 farm families concerned with the SAED program. The rural agricultural structures will then be affected from outside (guidance) as well as from inside (heads of groups, training actions). The number of producer groups ought then to increase from 267 to 870 by 1985.

With farmer acceptance of different irrigation techniques, the standard of living of the region will definitely increase. Actually, SAED farmers already have realized, in some areas, an income of about 80,000 CFA as compared to 20,000 - 35,000 CFA in areas of traditional agriculture.

2. Impact on SAED and its personnel

It is not necessary to enumerate here the numerous advantages that will accrue to SAED and its personnel. The qualitative improvement of its personnel will have a direct effect on SAED's productivity. In addition, the goal of developing up to 50,000 ha. to be eventually managed by the producer groups would be reached. Approximately 1000 cadre and agents will be trained during the project. This number will again increase until 1985.

Conclusions of Analysis

Considering all the cited needs, some recommendations can be made.

All training structures for the rural population need to be reinforced if the producer groups are to assume management control of the perimeters.

First of all, it is important to create a paramount training structure for SAED field workers, technicians and administrative personnel.

Senegal does not have specialized institutions in training for irrigation techniques. This underlines the merits of the SAED proposal for the creation of a training center for irrigation techniques.

Taking into consideration the proposed SAED extension program, the integrated training project should become operational by 1977.

To assure maximum success for the project, the management function of SAED personnel should be revised and a detailed job description should be completed for all levels of personnel.

IV - THE PROJECT

Types of Training and Proposed Methods

1. Training of rural farmers

The project does not directly intervene at the farmer level. It only aims at extending the impact of training by augmenting existing personnel, means and equipment.

2. Training of selected farmers and farmer group chiefs

Here also, the project does not directly intervene insofar as the training concept and methods are concerned. It influences this part of the integrated training program only with an increase of the potential for existing training.

3. Training and improvement of SAED cadre, technicians and field agents

For efficiency in the performance of duties by SAED cadre and agents, and in order to avoid a cumbersome program in relation to the real training needs, the program will be set up according to the following scheme:

a. An analysis of duties to be performed at each level. The training goals will be separated and divided into theoretical and practical knowledge.

b. Teaching will be done on the basis of active pedagogical methods, i.e., a constant dialogue between teachers and trainees. In this way, the trainees will be encouraged to discover by themselves most of the training elements.

c. Emphasis will be placed on practice in the field by cadre and agents. This is one reason for having the training infrastructure established at the site of a perimeter which represents all the land preparation and development to be done by SAED.

d. Teaching at this level will be done in two ways: short-term training (10 to 15 days) several times a year to upgrade and improve SAED personnel already on board, and middle-term training (two to three months) for newly-hired personnel.

Trainees will be boarded at the site of training.

4. Training and improvement of maintenance, farming, management and administrative personnel

This will be mainly a question of upgrading skills. The agents will be trained by professional grouping. Considering that they are geographically dispersed, they will be trained as much as possible at the site of their work (workshops, fields, offices, warehouses, etc.).

However, the heads of teams or departments who will also be trained by professional groups will be gathered either at Ross-Bethio or at one other perimeter. The training should enable them to acquire an educator's profile while also improving them professionally. It will be their responsibility to insure the improvement and upgrading of the members of their respective departments and perimeters.

Training and upgrading should be essentially practical, taking into account SAED's real needs.

It will mainly be a question of on-the-job training that will allow, in many cases (mechanics, drivers), becoming more productive and allowing a flexible and dynamic type of training.

In its theoretical aspect, the training will be given in a simplified manner, considering the relatively low level of education of the staff.

Personnel to be Trained: Summary of Training Content

1. <u>Officers</u>	<u>Upgrade</u>	<u>Train</u>
Officers of BEP and divisions responsible for preparation and farming of perimeters	55	6

Training content: Modern farming of perimeters for irrigation, soils and cultures, light and heavy mechanization, water requirements, crop rotation, traditional and modern types of farming, irrigation methods, land preparation, business administration, work organization, etc.

2. Concept and study of perimeters

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Topographers	26	4
Sketchers	9	4
Observers/Investigators	27	12
Pedologists	<u>26</u>	<u>7</u>
	88	27

Training content: Topography, cartography, planimetry, use of topographic apparatus, topographic surveys, design of perimeter map, profile canals, flow calculations, statistical elements, investigative techniques.

3. Administration and management

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Assistants to administrators	6	6
Stock-keepers	10	5
Accountants	30	15
Administrative clerks	25	10
Secretaries	<u>36</u>	<u>8</u>
	107	44

Training content: Accounting, management, budgeting, stock management, marketing, commercialization of products, editing, classification, cooperative organization.

4. Guidance

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Field worker chiefs	27	17
Field workers	84	85
Administrators	<u>20</u>	<u>9</u>
	131	111

Training content: Elements of rural sociology, techniques of animation in the rural area, knowledge of cultures, irrigation techniques, animal traction techniques, cooperatives, cooperative functions, farming management.

5. Mechanical works and driving

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Heads of teams	10	2
Drivers, farm equipment	80	22
Drivers, heavy and light vehicles	<u>70</u>	<u>12</u>
	160	36

Training content: Awareness of different maintenance and repair costs of engines, vehicles and machinery, practical knowledge of use and maintenance of vehicles and machinery, causes of breakdowns, driving and security, agricultural machinery adjustment, etc.

6. General mechanic maintenance

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Mechanics (central workshop)	6	6
Mechanics (perimeters)	30	19
Mechanics (mobile units)	6	6
Welders	4	4
Turners	3	2
Mechanics for maintenance	3	2
Pumping station personnel	<u>2</u>	<u>2</u>
	54	41

7. Auto-diesel mechanics

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Mechanics (engines)	18	10
Mechanics (pumping stations)	16	12
Mechanics (cars)	11	10
Mechanics (agricultural machines)	<u>8</u>	<u>8</u>
	53	40

8. Electricity

<u>Personnel</u>	<u>Upgrade</u>	<u>Train</u>
Electricians (power plant)	15	9
Electricians (motor-engines)	5	5
Electricians (motor-engines-perimeter)	<u>5</u>	<u>5</u>
	25	19

Training content: General mechanics, auto-diesel, auto electricity, agricultural machinery electricity, breakdown detection techniques, sensitization to maintenance and repair costs, sensitization to the imperatives of the agricultural calendar.

In addition, all personnel concerned will be briefed on the SAED organization, its goals and its development relations with the farmers.

The officers, the heads of teams or departments, will integrate into the program courses dealing with problems of management, work organization and pedagogics. This will enable them to have a profile corresponding to SAED needs

Personnel Needs for Training

1. Number and function of training personnel

Director of training workshops	1
Head of audio-visual division	1
Head of literacy division	11
Head of cooperative division	1
Assistant to head of cooperative division	1
Manager of audio-visual training	1
Head of Perimeter Training Center	1
Manager of audio-visual mobile unit	1
Laboratory specialist	1
Photographers	2
Trainer (audio-visual)	1
Sketcher	1
Operators	2
Teachers	5

The personnel for training the rural population, for upgrading SAED agents, and for the preparation of training materials is insufficient for project needs.

The analysis of educator needs is divided into three parts: farming population training, cadre and field-level personnel training, and improvement of SAED personnel.

2. Personnel needs for farmer training

Senegalese personnel

4 ITA specialized in active pedagogical methods for the four secondary Training Centers at Matam, Bakel, Nianga and Dagana.

8 managers and operators for audio-visual units at Matam, Bakel, Nianga and Dagana.

4 training agents experienced in training techniques of rural populations as used by SAED and planned in Matam, Bakel, Nianga and Dagana.

4 teachers

3. Personnel needs for the training of Group Chiefs (Agricultural Improvement Center at Nianga)

Expatriate personnel

1 Head of Project, agronomist, training specialist, BIT expert

Senegalese personnel

1 ITA counterpart (Head of Project and Director of Center)

2 Agriculture/Livestock instructors in charge of the pilot farmer training

2 Craft instructors for the wood and mechanical/metal sections, respectively

This Agricultural Improvement Center is actually operational at a low scale. However, it ought to train 35 trainees/year starting next cycle. Considering the number of Producer Groups existing and to be created, this capacity should increase to 80 trainees/year. In order to reach this number, it will be necessary to add to training personnel:

1 instructor in agriculture/livestock

4. Training of officers, technicians and field personnel

The creation of a National Center for Irrigation at Savoigne will be set up precisely for training and improving officers, technicians and field agents presently working or newly-hired by SAED. Considering the staff number concerned, the following training personnel should be planned:

a. Expatriate personnel

1 agro-pedagogue, engineer level, with knowledge of land preparation techniques and farming of irrigated perimeters. Function: Head of Project, part-time teacher.

1 technician specialized in preparing curricula and training materials. Function: Head of Studies Bureau at Savoigne and Workshop Training Counselor.

b. Senegalese personnel

1 rural engineer or specialized agronomist. Function: counterpart of Head of Project, Director of the Savoigne Center. Part-time teacher.

1 rural engineer, teacher
 1 rural economist, teacher
 1 instructor in agricultural machinery, part-time teacher (BEP technician)
 1 ITA pedagogical and animation specialist (Head of Perimeter), part-time teacher
 1 cooperatives inspector, part-time teacher (cooperative division)
 1 agronomist to be trained in the study and conception of training material necessary to the Savoigne Center.

5. Upgrading of farming, maintenance, administration and management personnel

Expatriate personnel

1 instructor in vehicle and diesel mechanics

Senegalese personnel

1 instructor in general mechanical maintenance
 1 instructor in auto-diesel mechanics
 1 instructor in mechanics and driving (head of team)

For the other portions of the training/improvement program, the various heads of departments and divisions will be called upon, since the entire program is the responsibility of the Training Workshop Director and the Head of Project.

6. Training organization

Training of various counterparts to expatriates will take place in three phases:

a. Initiation phase to training problems faced by the project; it will take place on site, for about one year.

b. Complementary training phase of which some aspects could be undertaken abroad

c. Work relation phase between expatriates and Senegalese leading to the take-over of responsibilities by the latter.

This part of the project will be carefully studied since extension of the program depends on it.

Other teachers will receive, locally in specialized Senegalese institutions, the pedagogical training and technical training necessary to their duties.

6. Organization of training for chiefs of Producer Groups and the rural population

There are no notable changes except that all current actions will be extended and developed according to changing needs.

Heads of Secondary Training Centers will be in charge of registering and transmitting training and upgrading needs to the Director of Workshop Training and the Head of Project who will be responsible for organizing training sessions/

7. Organizstion of training for SAED officers and personnel

Officers and technicians, as well as the field personnel will be trained at the National Center for Irrigation Techniques which will be established at Savoigne. Thus, whether it is a question of short-term training (upgrading) or middle-term training, the Center having a tertiary set-up of 400 ha, will constitute a practical application field.

Located half-way between Saint Louis and Ross Bethio, this Center could easily call upon SAED headquarters personnel for different training and upgrading programs. In fact, for some fields it is preferable to have the active participation of officers already cognizant of all the problems related to the development of irrigated perimeters by SAED.

Heads of departments and section teams will be trained as professional groups. Their skills will be upgraded in their specialty and they will particularly receive an educator's profile so as to be able to assure improvement within their own offices, workshops, etc.

Field-level personnel, as well as management and administration, will be upgraded either at their assigned job or in one of the operational units (perimeters).

The length of sessions will vary according to the needs and specialties. The availability of personnel will be strictly coordinated with the agricultural calendar. In most cases, it will be preferable to regroup the same agents for sessions not to exceed one to two weeks. One should underline that the training profile acquired by the heads of departments, teams, etc., will reduce the negative effects of having personnel move to central points for training.

The maners of the project, with the help of the Training Workshop Director, will assure the organization and supervision of this training. As a whole, the training of and upgrading of skills will be as follows:

Administration and management personnel: All personnel will be trained at Ross Bethio and will take advantage of the installations of the Delta Perimeter Training Center. Teaching personnel will be recruited from the Commercial and Administrative Division (Director or Assistant to the Director) and particularly from the Accounting Office.

Maintenance personnel: The Chiefs of Mechanics Workshop Sections at the perimeters will be grouped at the Ross Bethio Central Workshop for training by the expatriate mechanics instructor and his counterparts.

Mechanics and Drivers: The chiefs of farming units and the team will be trained at the Ross Bethio and Delta perimeters by the Chief of the Heavy Equipment Division of SAED, the mechanics/instructors of the Central Workshop and by a specialized farm equipment trainer.

8. Buildings and necessary equipment

It will be necessary to build three training centers at Guede, Matam and Bakel. In addition, one should plan the renovation and adaptation of buildings used for the training and the Delta Perimeter Training at Ross Bethio.

Secondary training centers ought to have one classroom accommodating 20 trainees, one kitchen and one dining hall, as well as one simply-equipped dormitory.

Each secondary training center should have one field for practical application of farming techniques, as well as equipment for teaching animal traction/ These centers will have the pedagogical material necessary (audio-visual, blackboards, training material, etc.). It will be necessary to equip each center with one vehicle to transport 8 to 12 persons and one light vehicle.

Training Group Chiefs: The capacity of the Nianga Center is adequate to 56 persons. It will have to go up to 80 by increasing the construction. Equipment supplies will be increased and it will be necessary to add two 18-seat buses for transportation of trainees.

9. National Training Center for Irrigation Techniques

This Center, to be built at Savoigne, will consist of one building/dormitory housing 20 trainees and composed of:

- Dormitories
- Dining hall
- Kitchen
- Baths/toilets
- Food storage

Another building will have

- 40-seat conference room
- 20-seat classroom
- Library
- Storeroom
- Bathrooms

One annex will have

- Director's office
- Study room
- Teachers' room
- Secretariat-accounting offices
- Bathrooms

Teaching staff housing (7)

Material and equipment: All necessary audio-visual and training material will be furnished, with specialized material required by the research department and for construction of training aids.

Savoigne Perimeter has no farming equipment. Until now, the Ross Bethio Central Office of Material has put equipment at the disposal of the Savoigne Perimeter, but it must be re-equipped if it is to be functional and representative.

Engine and agriculture machinery

1 80 hp Caterpillar tractor
 1 80 hp tractor
 1 45 hp tractor
 2 plows with discs
 1 tip-lorry
 1 ridger
 1 offset
 1 float
 2 threshers
 1 seeder
 1 trailer
 1 lubricating-draining station
 2 5000-liter motor fuel tanks

Vehicles

1 station wagon (office car)
 1 18-seat bus -
 4 light cars
 1 pick-up

Project Evolution

1. Preliminary Phase

When the financing is assured, construction of the National Center at Savoigne and the secondary training centers should begin in order to allow their opening for the first semester of 1978.

The Head of Project will establish a list of materials during a pre-project visit to Senegal during the summer of 1977. He will be installed as soon as possible. He will then, with the assistance of the General Director and the SAED Training Workshop, make a priority list of trainees to be trained and upgraded. The remaining two expatriates will arrive in January 1978 and will participate with the Head of Project and the Training Workshop in the preparation of a definite training and improvement program for the first operational year.

The counterparts and Senegalese teaching staff will be selected at this time. Orders will be received and reviewed by the Project Officers.

Recruiting of the first trainee section will take place so as to begin the program by April-May 1978. At the same time, the training material and installations will be put into place.

2. Operational Phase

By May 1978 the three parts of the project (training of rural farmers, training of officers and technicians, training of SAED personnel) will be operational. Each objective of the training model will be evaluated as the project progresses. However, every semester the offices, departments and workshop "users" of the trained personnel will be requested to evaluate the training and upgrading programs.

During this phase, starting the third year, an evaluation of the integrated training will be made within the Producer Groups in order to determine the effect of the training activities at the level of the ultimate beneficiaries as well as at the SAED level. The rate of progressive take-over and the process of management of the perimeters by the farmers will be the best evaluative test. Likewise, a decrease in farming cost should occur and will be used as an evaluation factor.

The last phase will occur as follows: the counterpart will progressively take charge of the training functions, the expatriates remaining present as counselors. Through joint work along the lines of seminars, the Senegalese teachers and expatriates will make a complete study of the training program and will evaluate and revise it as necessary. The work of evaluation and consideration will be the product of input from the field at all levels and from various meetings between farmers and SAED personnel.

Starting October 1982, the project will be handed over to the Government of Senegal and particularly to SAED.