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AID Evaluation Special Study No. 34

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# **Development Management in Africa: The Case of the Bakel Small Irrigated Perimeters Project in Senegal**

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DEVELOPMENT MANAGEMENT IN AFRICA:  
THE CASE OF THE  
BAKEL SMALL IRRIGATED PERIMETERS PROJECT IN SENEGAL

AID EVALUATION SPECIAL STUDY NO. 34

by

Matt Seymour, Team Leader  
(Bureau for Latin America and the Caribbean, AID)

Laura McPherson, Rural Development Specialist  
(Institute of Development Anthropology)

David Harmon, Management Consultant  
(Development Alternatives, Inc.)

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The views and interpretations expressed in this report are those of the authors and should not be attributed to the Agency for International Development.

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PREFACE

The limited management capacity of developing country personnel and institutions is a common problem affecting the success of development projects. Although this problem is often identified, there is little understanding of what "capacity to manage" means and what interventions are possible to enhance this capacity. The Center for Development Information and Evaluation (CDIE) of the Agency for International Development (AID) has undertaken a series of studies to better understand the nature of these development management problems and to assess the impact of management development interventions that AID and host country project managers have employed.

This series began in September 1984, when all team members attended a workshop on development management organized by CDIE and the AID Africa Bureau and held at Easton, Maryland. Six country studies on agricultural and rural development projects in Africa were carried out between September 1984 and March 1985. A workshop to review the findings of the study teams was held in May 1985 in Washington, D.C. Synthesis reports will summarize and analyze the results of the studies and workshops and relate them to program, policy, design, and implementation requirements. Irving Rosenthal has been the CDIE coordinator for the series. This study of the Bakel Small Irrigated Perimeters project in Senegal was conducted in January 1985 as part of the African phase of the special studies series on development management. Other Africa project studies were carried out in Kenya, Liberia, Lesotho, Zaire, and Niger.

SUMMARY

The Bakel Small Irrigated Perimeters (BSIP) project was initiated in 1977 to introduce irrigated rice agriculture to the upper reaches of the Senegal River Basin. The management strategy was to build on the efforts begun by farmers to install small irrigated perimeters. The project worked with the Senegalese parastatal agency, the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED), to supply farmers with inputs and extension services, while farmers supplied labor to develop the perimeters.

Although the project met only 50 percent of its quantitative output objectives, its accomplishments are important because of farmer acceptance of irrigation technologies, increasing farmer participation in the project, and flexible SAED management.

Major findings are that these accomplishments were possible because of concomitant policy changes by the Government of Senegal and SAED and that success was enhanced by the openness and outward orientation of the people of Bakel and the willingness of SAED to let farmers organize and administer irrigated perimeters on their own terms.

Key lessons learned are as follows:

- Projects should carefully assess sociocultural and economic characteristics of a target population during project design. A project that is considering the introduction of new technology may be more successful if it starts in an area where people are more open or have experience outside their village or area.
- A project management strategy will be more effective if it fosters local participation in management decisions and permits local organizations to build on indigenous structures and practices in the area. Allowing the organization to choose its own officers and management style, for example, will foster organizational, and hence project, sustainability.
- Appropriate government policy changes may be necessary to enable target populations to participate effectively in project decision-making. Although a project may be performing well in the field, if national or regional policies (e.g., pricing) are inappropriate, incentives may be inadequate for project sustainability.

- A hands-off approach to a project by a donor can be effective management under certain conditions. If host country staff is adequately trained, a loose management style can foster a sense of ownership of the project among this staff. This sense of ownership may be an essential ingredient for sustaining key project efforts after donor funding ceases.
  
- A strategy fostering beneficiary participation requires concomitant and comprehensive training. Providing responsibility with little means to exercise it may prove frustrating and unproductive. A carefully designed and executed training program can help build beneficiary ownership of project objectives and actions. In addition, appropriate training for mid- and upper-level managers can have significant project impact, particularly when reinforced by needed policy changes.

PROJECT DATA SHEET

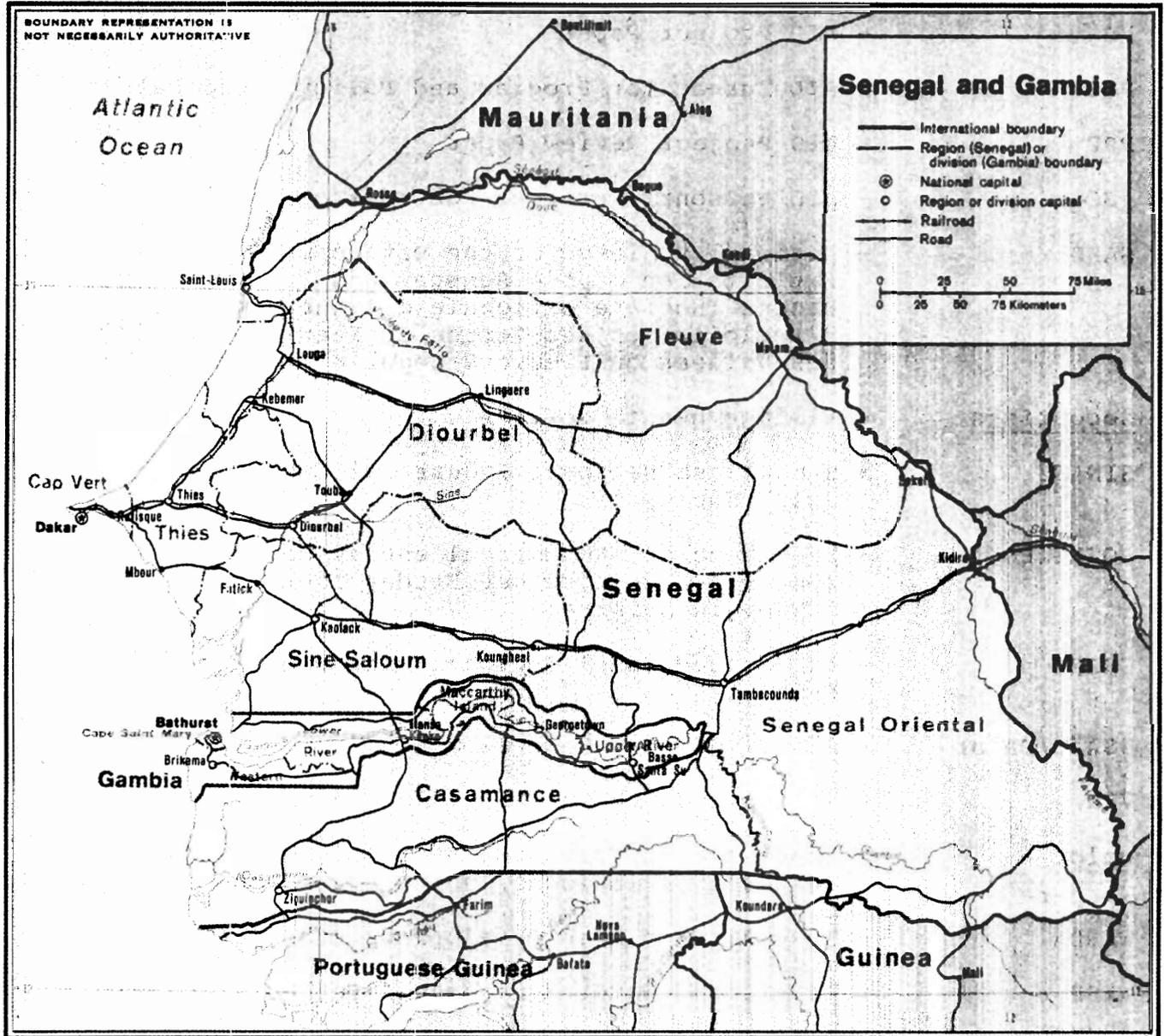
1. Country: Senegal
2. Project Titles: Original--Bakel Crop Production Project  
Current--Bakel Small Irrigated Perimeters Project
3. Project Number: 685-0208
4. Project Purposes:
  - a. To introduce the technologies of irrigated agriculture in the Bakel area of Eastern Senegal and to demonstrate the feasibility, both technically and economically, of irrigation in the area (as revised by the Project Paper Supplement--June 25, 1984)
  - b. To test the feasibility of using a solar pumping system in a rural area of a developing country (added in July 1978)
5. Implementing Agent: The National Society for the Development Exploitation of the Senegal and Faleme River Basins (SAED)
6. Project Authorization: May 10, 1977
7. Project Completion Date: December 31, 1985
8. Life of Project Funding:
  - a. AID \$8,199,000
  - b. Government of Senegal 2,400,000 (equivalent)
  - c. U.S. Peace Corps (3 PCVs) 150,000
  - d. Others (UNICEF, FAO, FAC) figures not available
9. Selected Outputs:
  - a. Hectares Irrigated 910
  - b. Farmers Trained 3,500
  - c. Villages Managing Irrigation 25
10. Local Currency: CFAF (Franc of the Communauté Financiere Africaine)
  - a. 1977: CFAF 250 = US\$1.00
  - b. 1985: CFAF 500 = US\$1.00

GLOSSARY

ADO	- USAID Agricultural Development Office
AID	- U.S. Agency for International Development
AID/Washington	- Personnel and office of AID in Washington, D.C.
ATA	- SAED extension agent (Agent Technique d'Agriculture)
BSIP	- Bakel Small Irrigated Perimeters project
CA	- SAED extension agent (Conseiller Agricole)
CDE	- Senegalese public construction company (Consortium d'Entreprises)
CDIE	- AID Center for Development Information and Evaluation
CDSS	- AID Country Development Strategy Statement
CFAF	- Senegalese local currency, (Franc of the Communauté Financiere Africaine)
CIDR	- International Company for Rural Development (Compagnie Internationale de Développement Rural), a French nongovernmental organization
CNAPTI	- Senegalese National Training Center for Irrigation (Centre National d'Application et de Perfectionnement aux Techniques d'Irrigation)
CNCAS	- Senegalese National Agricultural Credit Bank
CPSP	- Price Equalization and Stabilization Office (Caisse de Perequation et Stabilisation des Prix)
DE	- SAED Equipment Division
DGRST	- Senegalese Government organization for scientific research (Délégation Generale de la Recherche Scientifique et Technique)
<u>dieri</u>	- Dryland agriculture and its land (in local languages in Bakel)

- DMD - SAED Training and Extension Division  
(Direction Methode et Développement)
- DPA - SAED Planning Division (Direction  
Planification et Aménagement)
- ENEA - Senegalese economics college (Ecole National  
de l'Economique Appliqué)
- FAC - French Aid Agency (Fonds de l'Aide et de la  
Cooperation)
- FAO - Food and Agriculture Organization of the UN
- FIPEC - a French accounting/management consulting firm  
(Fiduciere Paris Expertise Comptable)
- groupement - Village-level work group
- IBRD - International Bank for Reconstruction and  
Development (World Bank)
- IRAT - Institute for Research in Tropical  
Agriculture, international research institute  
located in Senegal (Institut de Recherches  
Agricoles Tropicales)
- ISRA - Senegalese Agricultural Research Institute  
(Institut Senegalais de Recherches Agricoles)
- MBA - Master of Business Administration
- MDR - Senegalese Ministry of Rural Development
- MOF - Senegalese Ministry of Finance
- MOH - Senegalese Ministry of Health
- MPC - Senegalese Ministry of Planning and Cooperation
- MPCS - Management Planning and Control System
- OMVS - International coordinating body for  
development of hydroelectric and other  
resources on the Senegal River (Organisation  
pour la Mise en Valeur du Fleuve Senegal)
- OXFAM - An international private voluntary  
organization, which originated as Oxford  
Famine Relief

PCV	- U.S. Peace Corps Volunteer
PDG	- Presidential Director General
PID	- AID Project Identification Document
PIV	- Village irrigated perimeter ( <u>perimetre irrigué villageois</u> )
PP	- AID Project Paper
PPC	- AID Bureau for Program and Policy Coordination
PRP	- AID Project Review Paper
PSC	- AID Personal Services Contract(or)
SAED	- National Society for the Development and Exploitation of the Senegal and Faleme River Basins (Société Nationale d'Aménagement et d'Exploitation des Terres du Fleuve Senegal et des Vallées du Fleuve Senegal et de la Faleme)
<u>secourists</u>	- Village health workers
SINAES	- Senegalese National Industrial Company for Solar Energy
SOFRETES	- French solar and thermal energy company (Société Française des Etudes Thermique et de l'Energie Solaire)
SRFMP	- AID-funded Sahel Regional Financial Management Project
USAID/Dakar	- AID Mission in Senegal
VHW	- Village health worker
<u>walo</u>	- Lands for and practice of flood recession agriculture in local languages of Bakel
WARDA	- West African Rice Development Association
WMSP	- AID-funded Water Management Synthesis Project



## 1. COUNTRY DEVELOPMENT SETTING

Senegal has a population of almost six million in a 76,000-square-mile area. The population is concentrated in the urban industrial area of Dakar and the neighboring peanut-growing basin. The northern and eastern half of the country is sparsely populated, with the exception of a thin strip of villages bordering the Senegal River. The Senegal River Valley, however, has good soils and plentiful river water, which makes it attractive as an agricultural, particularly food-producing, region. To date, the major crops cultivated in the area are rice, sorghum, maize, and vegetables.

Since the French colonial period, four major trends have occurred in the Senegal River Basin. First, irrigation development has generally proceeded from the mouth of the river to the middle of the basin and only recently to the upper parts of the basin. Second, with the expansion of irrigation have come increasing attempts at water control. Currently, two major dams--one downriver, the other upriver--are under construction to provide flood control, saline protection, and hydroelectric power. Third, earlier large-scale irrigation schemes are giving way to smaller scale schemes. Ecological and economic constraints have demonstrated that small-scale schemes in the middle and upper reaches of the basin are organizationally and productively more efficient than large ones. Fourth, with the penetration of the infrastructure along with the installation of irrigation schemes, farmer participation in all aspects of irrigated production has increased.

In the 1960s and 1970s the main development organizations in Senegal were the Regional Development Authorities. These were parastatal agencies that were regionally based and focused on production of the crop suited to that region. In the case of the Senegal River Basin, the agency was, and still is, the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED). Established in 1963, SAED began work in controlled-flood irrigation on state-run farms in the delta, but has progressively moved upriver, opening its last area headquarters at Bakel in 1975. SAED has dealt with farmers through indigenous producer groups (groupements de producteur), which are irrigation associations rather than cooperatives. SAED provides inputs on credit to farmers, while the latter provide management and labor to develop irrigated perimeters for food production.

In the 1980s SAED's role changed from controlling major aspects of agricultural production and distribution to guiding and providing assistance to farmer producers. Senegal's agricultural policy of 1984 reinforced this by advocating

- A reduced role of the regional development agencies and increased participation by rural peoples in agricultural production

- An improved supply of inputs through private enterprise
- Improved price and related policies by increasing the price of imported rice and the floor price for cereals
- Crop diversification over emphasis on one crop in a particular region

Increasing food production is a major goal of Senegal's agricultural policy, with more efficient dryland and irrigated agriculture as twin pillars for attaining this goal. It was in this setting of increased crop production and diversification on the national level, SAED's disengagement on the regional level, and greater farmer participation on the local level that this management study was conducted.

## 2. PROJECT SETTING

The area of influence for SAED/Bakel extends along the eastern border of Senegal directly east of the capital city, Dakar. The area encompasses 25 riverine villages--either on the Senegal River or a smaller one, the Faleme--spread over 150 kilometers and with a population of 30,000-35,000 people.

The SAED and most Senegalese Government departmental headquarters are located in the town of Bakel, with a population of 10,000-15,000. As of 1983, Bakel is accessible by paved road from St. Louis and by a well-traveled dirt road to the regional capital of Tambacounda. Flights to and from Dakar are once a week. Within the area, transport is either on seasonal and rough dirt tracks or, during the rains, by boat.

Much of the project zone comprises one portion of the Soninke enclave which straddles the borders of Senegal, Mali, and Mauritania. The Soninke have historically engaged in trade and continue to migrate in significant numbers elsewhere in Africa and to France. The Soninke are considered to be among the richest group in Senegal. The Soninke society is stratified by nobles, craftsmen, and former slaves but has a strong tradition of social cohesion and collective action for community goals.

The Toucouleur who inhabit the Faleme River villages are historically sedentarized Fulani. They too have engaged in trade and migration, but to a lesser extent than the Soninke. Their society is similarly stratified but built on a strong ethic of individualism rather than the community orientation of the Soninke.

Until 1975, both groups had subsisted primarily on rainfed production of sorghum and millet, with some flood recession fields in maize and cowpeas. Irrigation was essentially unknown.

### 3. PROJECT DESCRIPTION

The Bakel Small Irrigated Perimeters (BSIP) project addresses the problem of how to maximize use of water, the scarcest resource in the Sahelian region, to increase food production. In addition, the project addresses emigration of residents by offering them local opportunities in agricultural production. The project purpose is to introduce technologies of irrigated culture in 25 villages along the river in the Bakel area and to demonstrate the technical and economic feasibility of irrigation. Project outputs include introduction of improved practices for dryland crops; development of 1,800 hectares of irrigated small perimeters in 23 villages; and improved understanding of the area's health situation. The project strategy is to build on the efforts already begun by farmers to install small irrigated perimeters by assisting the Government implementing agency--the parastatal SAED--to supply farmers with necessary guidance, inputs, and extension services, while farmers supply labor to develop the perimeters.

AID had allocated over \$8 million to the project. Agriculture programs were active in 25 villages. A total of 3,500 farmers were organized into 28 village-level groupements, which are precooperative organizations based on traditional social structures created to pursue specific tasks, in this case irrigated agriculture. Over 700 hectares were irrigated through 1984, with an average yield of 4 tons of rice per hectare recorded in 1983 in some areas.

The project constructed an operations base near Bakel that includes a guest house, equipment repair center, parts stockroom, offices, conference rooms, and apartments for staff. A demonstration farm was conducting applied research, producing seed, and providing extension services to farmers. In cooperation with the U.S. Peace Corps, fish culture was introduced.

The project trained or improved the skills of most farmers participating in irrigated agriculture in the project zone through a series of crop production workshops in villages and visits by the farmers to the demonstration farm. Subjects covered include proper fertilizer selection and application; economic use of irrigation water; weed and pest control; rice, corn, and vegetable production; and postharvest handling. In addition to the training and extension services of SAED, formal courses were organized for the following:

- 8 SAED mechanics who studied pump repair and maintenance (16 person-months)
- 30 village pump operators (60 person-months)
- 30 village youth in a local program (30 person-months)
- 4 long-term students who studied agronomy, agricultural management, and agricultural engineering at U.S. universities (83 person-months)
- 1 person who studied soils analysis in France for 3 months

In addition, because of concern over the possible effects to public health from increased standing water in the area, the project included a health component for both preventive and promotive village health services and for health surveillance. Under this component, a unique study of the epidemiology of schistosomiasis was undertaken, baseline surveys were performed, 38 village health workers were trained and are operating in 25 villages, and a prophylactic drug distribution network was established. (Because this component was essentially separate from the agricultural thrust of the project, it will not be discussed in this study.)

Finally, in cooperation with the French Government and the Senegalese organization for scientific research (DGRST), approximately 10 percent of the AID funds were spent on a prototype solar pumping station near Bakel. The station proved inappropriate and is not operating.

A more detailed description of the evolution of the project is found in Appendix A.

#### 4. ANALYSIS AND FINDINGS

##### 4.1 Contextual Factors

##### 4.1.1 Sociocultural Factors

The Soninke and Toucouleur people of Bakel have a tradition of migration and outward orientation that is unusual in rural Africa. As a result, the Soninke have numerous contacts and employment opportunities in France, as do the Toucouleur in other urban areas of Senegal. Of the approximately 60,000-80,000 black African immigrant workers in Paris, an estimated 65

percent are of Soninke origin. Since independence, about 50 percent of the economically active male population of the Soninke are migrants at any given time. Although absent from the village for long periods of time, migrants intend to return home, are in regular contact with relatives at home, and routinely send remittances to relatives.

This outward orientation has had a strong impact on project implementation. The project purpose was to introduce the technologies of irrigated agriculture in Bakel villages and to demonstrate the technical and economic feasibility of irrigation. AID could not have picked a better socioeconomic test bed for its project. Many of the returned migrants had seen irrigated farming. Indeed, the project was actually initiated by a returned migrant. Many spoke French and had learned to deal with foreigners, contracts, and cash transactions. They had also learned skills in the urban centers of France and West Africa, some of which could be applied to project implementation, such as basic machine repair, driving, literacy, and elementary computation. In fact, a few of the village irrigated perimeters (PIV) officers interviewed said they had learned these skills abroad. The Soninke and, to a lesser extent, the Toucouleur were quite open to this project effort.

#### 4.1.2 Policy Factors

SAED became involved in the area in 1975, working initially with villagers by moving up and down the river. During this time, SAED was one of several Regional Development Authorities in Senegal, and it operated under an all-encompassing Government mandate. Its management style at that time could be characterized as top-down, tight, and directive. Reduction of the overall national food deficit was one of its main objectives. With the world market for Senegal's main cash crop--peanuts--falling, import substitution became a theme. SAED thus entered the Bakel area with the intention of opening new land to irrigation for production of what it perceived as Senegal's favored crop--rice.

The farmers of Bakel, on the other hand, were anxious to refill their granaries, which had been depleted during the 1968-1973 drought, and had no particular interest in rice. Sorghum, millet, and maize were the preferred crops in the Bakel area. The farmers also knew their soils better than early SAED technicians and found only about 10 percent of the zone well suited to rice.

SAED and the farmers also differed in their views on marketing. SAED expected the farmers to continue to cultivate dryland sorghum for consumption and to irrigate rice for sale to SAED at prices fixed by the Government. SAED would then process

the paddy at central facilities and sell it to help cover its costs. Until 1981, in fact, the annual contracts required that the groupements sell SAED surplus paddy after consumption needs were met.

What happened over time was very different from the SAED plan. Farmers elected to irrigate sorghum, maize, and some rice for consumption or sale within the village or to petty traders at a market price. They paid their debt for inputs to SAED from remittances from migrants and declared that they had no surplus rice for SAED. In 1982, when some villages wanted to initiate irrigated banana plantations with assistance from another organization (SAED provided assistance only in rice), SAED cut them off from diesel fuel and spare parts for their pumps. A major revolt was underway.

At about the same time, under pressure from donors, the Government was revising its policy on Regional Development Authorities and parastatals, moving toward disengagement of these organizations in favor of a less controlled economy. In response to the specific problem at Bakel, it replaced its director. Concomitantly, it removed from all SAED contracts the requirement for sale of rice and began slowly to increase the price. By 1984, SAED had entered a second planning period in which disengagement was key and was working on strategies that would lead to autonomous and financially self-sustaining perimeters by 1987. Farmers could plant what they wanted and market how and to whom they wanted, and the Government price was almost competitive. The policy support of the producers' needs proved critical for farmer acceptance of integrated technologies and commitment to participate fully in perimeter operations.

#### 4.2 Organization and Structural Factors

Although much of the trouble with BSIP was due to SAED's inappropriate policies during the late 1970s, some was due to poor communication and inadequate understanding of the nature and functions of the various organizations managing the project. The basic management entities of BSIP are as follows:

- Individual farmers, who cultivate their parcels
- Village groupements, or irrigation associations of individual farmers, that are responsible for overall irrigated perimeter management
- SAED/Bakel, an "autonomous delegation" of SAED located in Bakel region, consisting of a headquarters at Bakel township and three zonal offices, and responsible for all irrigation operations in Bakel

- SAED/St. Louis, the SAED headquarters, which provides policy guidance, training, management and administrative backstopping, financial resources, and supervision to SAED/Bakel
- USAID/Dakar, the AID Mission in Senegal, which provides funding and technical and policy guidance to both SAED/St. Louis and SAED/Bakel

The distant nature of the relationship between AID and SAED fostered SAED "ownership" of the project. Although the AID Project Paper assumed strong management capabilities within SAED, by reserving financial and procurement responsibility to USAID/Dakar or technical assistance contractors, early project management strategy did not provide a framework to support these capabilities. The USAID Mission in Dakar was still relatively new and establishing its own systems. Personnel turnover related to BSIP was high. The SAED office in Bakel was equally new and suffering many of the same problems. Communication was poor, and both SAED Senegalese staff and AID-funded technical assistance contractors were often left to fend for themselves.

A strong sense of pride and ownership evolved in what eventually became a successful undertaking in Bakel. AID-funded technicians were integrated into the SAED/Bakel structure rather than having a separate identity and often received more technical and moral support from SAED (either Bakel or St. Louis) than from USAID/Dakar. Because of staffing problems, USAID had increasing trouble with commodity procurement; therefore, more was done by SAED/St. Louis, with the Bakel staff doing footwork and USAID paying the bills. Senegalese and U.S. personnel lived in the same housing in the same isolated area. Most tended to work longer hours than they might have in an area with more outside diversions, and most developed a strong sense of commitment to the farmers. What started as a weak management strategy by AID designers became a positive force in project performance.

Recent Senegalese Government and SAED policies now support transferring this "ownership" to farmer groupements. SAED/St. Louis has developed training materials for use in Bakel for literacy and basic computation training for groupement officers. SAED/Bakel staff are also working closely with these officers to establish formal structures to enable farmers to participate in overall management of irrigation in the area, moving toward fully autonomous and self-sustaining perimeters by 1987. A joint committee of five SAED/Bakel officers and five groupement presidents (elected by a plenary of all presidents) was being formed during the team's visit, and all were cautiously optimistic about the outcome.

### 4.3 Administrative Processes

Although some of the early BSIP literature tends to imply that groupements are monolithic entities, they vary considerably in roles and strength. Organizationally, they tend to provide a focus for self-selected participants to cooperate in decisions and tasks necessary to support cultivation of individual plots. Administratively, they serve an important function both for planning, executing, and monitoring individuals' contributions (cash and labor) and for maintaining external administrative relationships with SAED and other institutions.

Initial land clearing and preparation of a new perimeter is done in close collaboration with SAED and often is performed by a special task-specific organization of subgroups. As the perimeter moves under cultivation, the work of ongoing operations and maintenance requires more fixed schedules and activities requiring more internal organization, administration, and supervision. These latter activities are of three sorts:

1. Activities for which the groupement assumes collective responsibility and authority, often through its officers. These activities include canal and earthwork maintenance and repair; care, maintenance, and operation of the pump or pumps; and repayment of credit to SAED.
2. Activities that require close cooperation between the groupement as a management entity and the individual member-cultivators as farm managers. These activities are water distribution and credit repayment to SAED.
3. Activities for which individual cultivators are responsible. These activities are water distribution and credit repayment to SAED.

To date, most emphasis has been on the first and third of these activities. For the first--activities requiring groupement members to work together--the key actors are the officers. They deal with SAED, generally making decisions on timing of inputs and technical assistance and negotiating more delicate issues such as debt repayment or pump replacement. Several officers emphasized that they always convene a village meeting after a decision is reached or an issue raised to obtain consensus. In general, the credibility of the officers has been maintained primarily through ensuring that officers are well-respected village leaders in the traditional--or at least pre-SAED--sphere. They are often persons of well-regarded family who have experience with the outer world (e.g., France) and who have maintained adequate ties and status within the village. They are usually

not the village chief, but may be a relative and are certainly approved by him. Because they have the authority as groupement officers to incur responsibilities or even debt, it is important that they maintain legitimacy within the village.

Officers may or may not have other advisers, depending on the situation in the village. Some groupements have advisory councils of older, respected men. Others--notably in Toucouleur villages--seem to give less credence to who is president and more to group decisions. What is important is that officers are generally stable and that few internal disputes regarding corruption or mismanagement have occurred. That SAED has allowed the organizations to choose their own officers and to develop their own administrative systems seems to have been critical in promoting the groupements.

Choosing their own systems, particularly for water distribution and debt repayment, is the most visible activity requiring cooperation between the groupement as a management entity and individual cultivators. Although certain costs, such as pump parts or diesel fuel, are assessed on equal prorated shares, other costs are incurred by the groupement on behalf of the individual. For example, prior to the agricultural season, the groupement leaders record or memorize each cultivator's requirements for fertilizer and then place a bulk order with SAED. When the fertilizer arrives at the village, individuals are contacted to pick up their order and are theoretically encouraged to "pay as they go." When people can't pay--which is more often the case--the groupement assumes the individual credit and collects later in the year. This onlending role is important to the perimeter operations because planting season is also the time of year when food and funds are in shortest supply. As SAED divests itself of input supply services, the onus will increasingly be on the groupement to maintain payment from the individuals so as not to jeopardize the whole system.

Decisions and responsibility for field crop cultivation are left to the individual cultivators, subject to the officers' provision of specific inputs and to needs as defined by their household economies. SAED technicians, at the zonal or central level, may work with farmers on a self-selected basis to help them determine these needs and to recommend seeding and fertilizer application rates. Village extensionists, serving voluntarily, are also available for advice.

Thus, despite these variations in administrative processes and the tension between individual and group needs, a "fit" has evolved between SAED's bureaucratic directives and local management styles. With few exceptions, the perimeters have developed management styles that currently meet production needs, environmental constraints, and SAED guidelines. This fit refers to

shared understandings between SAED and farmers of their respective but complementary roles and responsibilities for managing the project. This complementarity between administrative processes of the bureaucracy and local organizations should be a priority in project design to ensure effective implementation.

#### 4.4 Resource Input Management

The key problem for the future of BSIP is financial sustainability. Major funding sources for BSIP are SAED, USAID, and farmer repayment of credit. USAID funding will cease when the project terminates, and SAED already has funding shortfalls. Therefore, unless farmers repay credit more fully and promptly, SAED will find it difficult to keep BSIP financially viable.

In the past, SAED has provided equipment, tools, extension services, and even the initial pump at no cost to farmers to create, develop, and expand perimeters. However, it provided seeds, fertilizer, diesel fuel, and spare parts for the pump on credit. It also expected farmers to deposit installments regularly with SAED to pay for the second pump once the first was beyond repair. Not one groupement has amortized the pump, and most have been tardy in repaying even a portion of their debts.

The latest complete data on the 1983-1984 repayment situation indicate that the overall credit situation is not good. Of the 28 perimeters, only 4 are up-to-date on both current and past debts; 4 more are up-to-date on current debts only; and 6 are up-to-date only on current rainy season debts. The rest owe debts on past and current seasons.

SAED has pressured farmers to establish amortization funds to pay for new pumps when the original ones wear out, but farmers pay lip service to this and still hope SAED will replace their pumps for free. Similarly, farmers accept that they must pay back credit, but on their own (relaxed) terms, not on those of SAED. Thus, if farmers believe SAED will replace their pumps, they similarly believe that SAED will forgive their debts.

The question, then, is will SAED continue the "soft" developmental approach to farmer indebtedness or will it adopt a "harder" commercial bank approach? Low repayment rates for inputs are necessary when farmers initially convert from subsistence to cash crop agriculture, but can SAED continue to afford these rates? It is perhaps less a question of whether farmers can afford commercial rates than whether they will accept them. Indeed it appears that the Government and SAED are already changing credit repayment terms from a developmental to commercial approach.

#### 4.5 Human Resources Development and Leadership

Training, as the project progressed, has been increasingly effective in providing managers with knowledge, skills, and orientation to carry out their roles. This has been more the case with SAED mid-level staff than with farmer managers. SAED also has standardized procedures for recruitment and staff development, whereas they are more informal and inconsistent for groupement officers and specialists (pump operators and extensionists). Participant training was not built as an integral component into the project but evolved as the need became apparent. Despite these shortcomings, however, training appears to have contributed to sustained participation by key personnel at the bureaucratic and farmer levels.

Training in SAED, as it relates to the BSIP, corresponds roughly by type, target groups, and function to the tier structure of the project. SAED staff receive extensive training at the main SAED training centers near their St. Louis headquarters. This staff in turn, as part of their field duties and along with U.S. technicians, train selected villagers at the project base in Bakel for management and specialist positions in the village. Finally the SAED staff, U.S. technicians, and extension agents train farmers at the village level. Thus, there is a cascading effect of training from SAED training centers, to the project base, to the villages.

SAED and U.S. technicians orient, sensitize, and train groupement officers, pump operators, and extensionists in Bakel. However, there are some shortcomings to this training, as orientation/sensitization provided to groupement officers is uneven and lacks followup. Although turnover among these officers is low, probably because those recruited come from village leadership, their understanding of their roles is often not clear. Moreover, treasurers have inadequate record-keeping skills, and often keep records on scraps of paper or in their heads. Officers have little conception of measuring inputs, their productivity, and the associated agricultural outputs. They need more detailed and comprehensive training so that they can instruct groupement members to prepare simple farm budgets with which to make production decisions. More attention is needed for recruitment and followup training of pump operators and extensionists, among whom turnover is high. The pump operator is a key position in perimeter operations and SAED needs to ensure that responsible persons are recruited who will stay on the job. Pump operators particularly need to be monitored and to receive followup training.

SAED admits that training for groupement officers and specialists has been less than adequate. SAED is improving training through meetings and visits to alert officers to

village indebtedness and to provide treasurers with skills to improve record keeping. In addition, many treasurers are illiterate and rely on a literate villager for assistance as a "cashier." SAED is planning literacy courses for villagers, and materials in the Soninke and Ffulbe (for Toucouleur) languages have been prepared.

Within SAED itself, recruitment, training, and promotion policies have contributed to improved leadership. SAED recruits managers and technicians from the Ministry of Rural Development and the general job market. The crucial factor determining one's rank in SAED is the level of education--with the senior staff possessing the equivalent of a Bachelor's degree or above, whereas the field staff have high school degrees--plus extensive rural development training. Salary is based on one's level of education and basic criteria of work performance, responsibility, discipline, and interpersonal relations. Recent attempts to tighten its loose incentive structure, along with increased in-service and overseas training, have enabled SAED to elevate superior leaders at the middle and upper levels.

This was evident in the BSIP project. At the project base, for example, several BSIP employees could substitute almost fully for one another on the job because of their hands-on training in different positions. In addition, the mid-level field managers demonstrated performances that commanded respect from other SAED staff and villagers.

The impact of good training and leadership was clearest in 1982 with the convergence of several factors. First, the farmers were ready to revolt and bring the project to a halt because of views differing from those of SAED regarding production and marketing. Second, AID and other donors at this time strongly pressured the Government of Senegal to encourage a free economy and greater farmer autonomy. As a result, SAED acceded to farmer views on diversified production and wider marketing. Third, SAED replaced the unpopular director with a charismatic one who had just returned from 6 years of study abroad. This energetic and well-trained director traveled throughout the villages discussing problems and listening to grievances. He even encouraged groupements to take more initiative as long as they cultivated the contracted numbers of hectares and showed good faith in debt repayment.

This was the "new beginning" of the project, as gross production of rice doubled from 1,200 metric tons in 1983 to 2,400 tons in 1984. The timing of this leader's appointment along with national policy changes and farmer pressure for more autonomy literally turned the project around.

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## 5. LESSONS LEARNED

1. Projects should carefully assess sociocultural and economic characteristics of a target population during project design. A project considering introduction of new technology may be more successful if it starts in an area where people are more open and have experience outside of a village or area.

2. A hands-off approach to a project by a donor can be effective management under certain conditions. If host country staff is adequately trained, a loose management style can foster a sense of ownership of the project by this staff. This ownership may be an essential ingredient for sustaining key project efforts after donor funding ceases.

3. Appropriate government policy changes may be necessary to enable target populations to participate effectively in project decision-making. Although a project may be performing well in the field, if national or regional policies (e.g., pricing) are inappropriate, incentives may be inadequate for project sustainability.

4. A project management strategy will be more effective if it fosters local participation in management decisions and permits local organizations to build on indigenous structures and practices in the area. Allowing local organizations to choose their own officers and management style is more likely to foster organizational, hence project, sustainability.

5. A strategy fostering beneficiary participation requires concomitant and comprehensive training. Providing responsibility with little means to exercise it may prove frustrating and unproductive. A carefully designed and executed training program can help build beneficiary ownership in project objectives and actions. In addition, appropriate training for mid- and upper-level managers can have significant project impact, particularly when reinforced by needed policy changes.

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## APPENDIX A

### PROJECT DESCRIPTION AND HISTORY

#### 1. THE LOCAL ORIGINS

Prior to the Bakel Small Irrigated Perimeters (BSIP) project, the Soninke and Toucouleur people of the Bakel area had two primary sources of income: dryland farming and remittances from family members working in France. Although endowed with relatively fertile soils and a location adjacent to the Senegal River, few had any experience with irrigation. In much of northern Senegal, the experience with irrigated agriculture up until the devastating drought of the early 1970s had been on large, capital-intensive state farms, often run by French managers.

In the late 1960s, a Soninke man from the village of Kounghani traveled and worked in France and observed various agricultural methods. On his return to his village, he had a rototiller to use on his land. Because of a number of reasons--lack of fuel, lack of spare parts, lack of experience--he was unable to use the equipment. He wrote for assistance to the director of the International Company for Rural Development (CIDR) in France, whom he knew because he had worked in the building that housed CIDR offices in France. The director recognized the need in Africa at that time but had no funding to provide assistance. CIDR thus contacted some other organizations, and eventually the British groups OXFAM and War on Want agreed to provide initial financing.

The first CIDR technician arrived in Kounghani in 1974. He lived in Kounghani for several months learning the culture and the language and organized a farmer group for self-help purposes. He then moved to Bakel township to begin activities in other villages. Two other CIDR volunteers arrived in 1975 to assist with the extension effort.

At approximately the same time, the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED) decided to move its operations further upriver and opened an office in Bakel. By this time, the CIDR technicians were working with organized groupements in 12 Soninke villages in Bakel in dryland agriculture and hand-irrigated gardening. SAED recognized the work as a "target of opportunity," and entered into a series of discussions with the technicians and villagers on the possibilities of cooperating in irrigated work.

Some reports from this period claim that SAED played a fairly aggressive role in these discussions and that the villagers were reluctant to join with SAED for fear of losing their independence and self-help achievements. Current

groupement officers interviewed by the team members indicated no real conflict but emphasized that they--not SAED--had formed the groupements and that they had always acted on their own. This sense of independence and group cohesion was to have a major impact on the project as it evolved.

The CIDR technicians slowly took on an identity as SAED staff and, with AID funding, worked with the villagers to develop irrigation schemes. As shown in Table A-1, these schemes were clearly effective.

## 2. AID AND GOVERNMENT OF SENEGAL INVOLVEMENT

AID's initial identification of Bakel irrigation as a potential project was made by a team of consultants from Washington who traveled through the Sahel in late 1973 looking for activities to finance under the special AID Drought Recovery and Rehabilitation Program appropriation. During 1974, as AID policy--and that of the Government of Senegal--moved away from immediate relief to longer term development, the two began discussions about potential projects on which they could collaborate. AID at that time was operating under a new mandate of the 1973 Foreign Assistance Act that directed it to work on projects that helped small farmers and maximized distribution of benefits and equity. The Government of Senegal was interested in developing the potential of the Senegal River Valley, both through large-scale plantation-type schemes and through smaller, locally managed efforts. SAED was charged with this task. It is likely that AID's interest in helping the small farmer, coupled with the fact that the Director General of SAED at that time was from Bakel, made for easy agreement over location.

In the spring of 1975, the Dakar AID office submitted to AID/Washington a Project Identification Document for a project in Bakel to irrigate 1,320 hectares of land for a cost of \$3.1 million. This document generated interest within SAED, and in July 1975, it submitted a request to AID Dakar for a 915-hectare project costing \$2.6 million. This request and the Project Identification Document generated funds from AID/Washington for further design; in October 1975, AID Dakar submitted a Project Review Paper for Washington's approval. This second-level document presented a vastly scaled-down version of earlier irrigation plans but included an emphasis on improving production in traditional dryland agriculture. It proposed a \$1.345 million project "to demonstrate the validity of village level small irrigated perimeters by increasing present surface irrigation systems to provide water for 200 hectares of land involving 16 villages in the Bakel area of Eastern Senegal. Food production will likewise be increased by a concurrent program of improving traditional crops in the same area."

Table A-1. Bakel Small Irrigated Perimeters Project Data

Year	Rain (mm)	Flood (m)	No. PIV	No. Hectares Irrigable	Irrigated Hectares Cultivated (gross prod. in MT)		
					Rice	Maize	Sorghum
1975-76	667.1	10.19	3	na	20 (46)	3 (6)	- -
1976-77	318.0	6.90	11	na	60 (130)	15 (30)	4 -
1977-78	384.0	7.0	12	na	85 (370)	20 (51)	6 -
1978-79	529.4	7.90	24	na	125 (650)	100 (250)	10 -
1979-80	404.8	6.24	24	na	225 (1069)	223 (538)	6 -
1980-81	393.6	8.66	26	na	270 (1283)	290 (530)	20 -
1981-82	560.3	7.74	26	na	286 (1770)	237 (568)	46 -
1982-83	573.8	6.37	26	na	297 (1200)	148 (443)	67 -
1983-84	393.2	4.92	27	na	439 (2397.85)	103	46
1984-85	-	-	32	761.6	525	147	58.5

Note: na = Not available.

Source: Data for all columns except "No. Hectares Irrigable" taken from the flip chart of the SAED/Bakel Project Director. Data for the "No. Hectares Irrigable" was not available to the team; the figures for 1984-1985 are from a report entitled Delegation de Bakel Situation des Aménagements au 1er Juillet 1984, Direction de la Planification et des Aménagements, SAED/St. Louis, June 1984.

As activities in Bakel continued under interim AID financing, AID and the Government of Senegal, through SAED, worked together on refining the design. As noted in the (final) May 1977 Project Paper:

SAED got down to serious work on the project. They sent topographic teams to the field to determine diking needs and to perform detailed topographic surveys and mapping of areas being planned for the 1976 season. SAED contracted for bulldozers to construct one protection dike and to clear stumps from the lands to be farmed in 1976. It provided tractors with discs to break up the new lands. These activities allowed the PP team to judge the feasibility first, of providing flood protection with a reasonable chance of success at a reasonable cost, and secondly, of utilizing a mixture of heavy equipment and hand labor to accelerate the development process. As a result of their review of the engineering, economic and human aspects of this accelerated development the recommendation to proceed with the 1,896 hectares identified by SAED was made.

The project purpose was modified to read "to introduce the technologies of irrigated culture in 23 villages along the river in the Bakel area and to demonstrate the feasibility, both technically and economically, of irrigation in the area." In addition to the enlarged hectarage, the final 1977 Project Paper also included the Project Review Paper's emphasis on dryland farming, although because of a lack of reliable baseline data, no specific targets on number of hectares of production increases were given. Finally, the Project Paper included slightly over \$400,000 in funding for environmental health, for surveillance of a potential increase in water-borne diseases as a result of irrigation, and for promotive and preventive health services at the village level. This health component was to be managed by a separate office of USAID/Dakar and the Senegalese Ministry of Health and was to run parallel to the SAED irrigation activities.

### 3. PROJECT IMPLEMENTATION: AGRICULTURE

#### 3.1 Dryland Agriculture

Very little information was included in the Project Paper regarding the strategies for improving dryland agriculture. The costs for the dryland component in the Project Paper provide an indication of its priority: interventions were estimated at

\$218,000 over 5 years, or less than 3 percent of the total proposed AID and Senegalese Government contributions. It can be deduced that the designers intended SAED to undertake the effort, although SAED has rarely worked in anything but irrigated fields during its long history. Whatever the intent, little if any work was done in dryland crops subsequent to the availability of AID funding. The existing groupements all shifted into irrigated work with SAED and continued their dryland activities on their own.

Research, extension, and training activities in dryland agriculture never really got underway. In late 1982, AID financed a major review of BSIP by the AID centrally funded Water Management Synthesis Project (WMSP). Consultants from this project recommended that

USAID must recognize the great opportunity to increase cereals production by crops other than rice and should commit resources to testing varieties of traditional crops and new crops for both rainfed and irrigated agriculture in the Bakel project area. Priorities should be set by insisting that cultivation needs and interests be determined and included in testing and research activities.

This recommendation, however, came after a year of poor rainfall and a major conflict between SAED and the villages. During the next 2 years, rainfall in the area was no better, and in 1983-1984 it was much worse. To date, SAED has undertaken no dryland activities. As one informed official noted, "The rainfall in the area has gotten so bad that we don't think about dryland potential anymore." Villagers interviewed by the team confirmed this feeling; they discuss "the days when it rained" with a finality that suggests those days are over. Although villagers still cultivate and plant traditional dryland fields, both they and SAED are putting more effort into the lower risk activity of irrigation.

### 3.2 Irrigated Agriculture

Table A-1 reflects the pace at which SAED and the cooperating village groupements opened land to irrigation. Although the current hectarage is far less than the 1,800 targeted, the purpose of introducing the technology has certainly been achieved.

It has not, however, been a trouble-free achievement. The initial CIDR personnel were originally contracted by USAID/Dakar to provide technical assistance under the larger project. Because of a dispute over salary levels, they left after

approximately 1 year, and the project was without technical assistance for a full year. During the interim, SAED continued its program, with monitoring by USAID/Dakar.

In addition to the lack of expatriate assistance, the technical assistance provided by SAED was uneven in these early years. The initial topographic and soil studies were poorly done, and SAED had difficulty getting bulldozers and other equipment to Bakel to level land so that farmers could build dikes and canals before they were needed. The farmers thus constructed these works according to their own plans, creating problems and additional rebuilding costs. Pumps and spare parts were unavailable when needed, the fuel supply was erratic, and frustrations were great.

Relations between SAED and the farmers were also strained on other fronts. The relationship between SAED and the farmer groups was governed by a short seven-page contract clearly stating the roles and responsibilities of each for construction and management of the irrigated perimeter, maintenance and payment for the pump, and marketing. Although SAED agreed to purchase rice, wheat, and maize at a price fixed by Government decree, the group had to agree to sell to SAED all of "its production surplus after satisfying consumption needs." (It should be noted that virtually no wheat was or is grown in the Bakel area.) Given that SAED's prices, particularly for rice, were generally well below the parallel market price in Mauritania or Mali, it is not surprising that reports from this era note a substantial shift in rice for domestic consumption as opposed to marketable surplus. It appears that relatively few SAED extension efforts were put into irrigated maize at this time, although each year more was produced by the farmers (see Table A-1). Thus, although the farmers did have ultimate responsibility for management of the perimeters, their incentives for doing so were limited.

The growing rift between SAED and the farmers peaked in the 1982-1983 season. The farmers had been pressing for increased diversification, and SAED offered to sell them banana cuttings at CFAF 350 each. At the same time, some of the farmers discovered that a nongovernmental development organization in the regional capital of Tambacounda would give them banana cuttings for free. The word spread through the villages, and many went to Tambacounda to solicit help.

The personnel at SAED/Bakel did not approve of the nongovernmental organization providing inputs for free, because they were trying to move the groupements into a self-sustaining cash economy. There also appear to have been some simple "turf" battles: SAED believed that it had the Government mandate to develop the riverine areas and that the nongovernmental organiza-

tion should have coordinated its activities with SAED. Relations between the villages and SAED became more heated, and several announced to SAED that they would cease working with SAED because of its lack of support for their needs.

There is an understandable difference of opinion about what happened next. SAED claims that the farmers backed out of their contractual obligations, so it had no obligation to continue providing them diesel fuel and pump parts. Farmers involved at the time were divided into two factions--both anti-SAED but promoting different strategies--and claimed that they had intended to fulfill that year's contract and then cease collaboration. Each party thus believed that the other was reneging on the contract. The groupements involved--reports suggest there were 11 or 12--had poor harvests because of a lack of diesel fuel for irrigation, and SAED suffered a major loss of credibility in the area.

The villagers and SAED--it is unclear who initiated contact--took their dispute to the relevant subprefects and then to the Prefect of Bakel Department. The Prefect traveled through the area, talking with farmers, but did not offer judgment. The farmers thus organized and went to the Governor in Tambacounda; he too failed to offer judgment satisfactory to all parties. Finally, the farmers selected representatives to go to Dakar. One group met with a well-regarded Bakel native son, a former SAED director general and current Minister of the Environment. A second group tried to see President Abdou Diouff, but as he was out of the country, pleaded their case instead to his top aide. Shortly after their return to Bakel, the offending SAED director was replaced. Although SAED officials laugh and say that he was up for rotation and the villagers' actions had no influence in the move, to the villagers they had won.

During the same period, SAED was beginning to implement its new 3-year policy (stated in the first Lettre de Mission) of progressive decentralization of both SAED offices and groupement responsibility. The new and energetic SAED director in Bakel thus arrived with a number of concessions: groupements would no longer be required to sell to SAED, they could cultivate whatever crop mix they chose, and they were encouraged to take as much initiative as they liked, as long as they maintained the contractual obligations of cultivating a minimum number of hectares and showing good faith in debt repayment. Perhaps most importantly, the new director traveled almost constantly throughout the first 6 months of his stay, talking over problems and listening to grievances. For many participating villagers, the project is described in terms of "before that director" and "after that director." His charismatic leadership combined with the major SAED policy changes and the villagers' confidence in their gains during the conflict all contributed to the feeling of a new beginning in the 1983-1984 agricultural season.

The dramatic increases in rice cultivation reflected in Table A-1 are indicative of this new beginning, as are a number of other visible efforts. Construction is nearing completion on village storehouses, so that the groupements can adequately pre-position and manage seed and fertilizer distribution on their own, and a joint committee is being formed with equal representation by SAED and elected villagers (five each) to plan for and oversee increased decision-making and authority by the groupements. At the time of the team's visit to Bakel, few complaints about relations over the last 2 years were heard. With poor rains, all seemed committed to making irrigated agriculture in Bakel work with a minimum of strain.

### 3.3 Related Agricultural Activities

As part of its new responsive approach, SAED has increased support for the villagers in their efforts toward diversification. A U.S. Peace Corps Volunteer was recruited and is working with several villages in fruit tree cultivation, primarily bananas and guavas. Demonstration farm personnel--notably the American agronomist--are working with a number of new women's and youth groups in vegetable gardening for consumption and profit. The farm is also aggressively undertaking trials in irrigated maize and sorghum--preferred crops in many villages--in addition to rice trials. An American adviser posted to SAED/St. Louis is working on several labor-saving devices, including rice decorticators. These related activities, many of which are done on technicians' personal time, appear to be greatly enhancing SAED's new image in Bakel.

## 4. HEALTH SERVICES AND SURVEILLANCE

The health component of BSIP was treated in the Project Paper and during implementation as a separate component under separate management at the national and local levels. The AID Dakar office hired former Peace Corps Volunteers to manage the project in the field and in Dakar. These people reported to the AID Dakar health officer, although efforts and reports were coordinated with the overall (agriculture) project manager. SAED had little if anything to do with the health component.

The component did not really get underway until 1978. The health services component was to establish village health huts in the 23 BSIP villages under the auspices of the Ministry of Health, with trained secourists (village health workers, or VHWs) and midwives supervised by village health committees operating small first aid pharmacies on a revolving fund basis.

By December 1980, 17 villages had VHWS operating pharmacies, although at least 3 were failing to meet the costs of the pharmacies. Management and supervision of these people was fraught with problems, as Bakel is far from its regional headquarters. Supply lines for pharmaceuticals and the relationship between Bakel district activities and the regional health authorities were not resolved until late 1982, when management was moved to Bakel. At the time of the team's visit, the Departmental Chief Medical Officer reported that the VHWS and midwives were still in place and working, although the pharmacies probably never would cover costs.

The health surveillance activity was run independently out of Dakar University's Department of Parasitology and the National Campaign Against Parasites. The head of both of these entities was the same well-qualified Senegalese doctor, so coordination was not a problem. From 1980 to 1983, teams were fielded, baseline studies were undertaken, incidence of schistosomiasis and other diseases monitored and treated, and laboratory technicians were trained and equipped to continue surveillance. This component was discrete and simple to manage, and it achieved its objectives.

## 5. THE SOLAR PUMP

Although the original Project Paper had only a single project purpose, that of introducing farmer-managed irrigated crop production into Bakel, in early 1978 a second purpose was added: to test the feasibility of a solar pump for irrigation purposes. This add-on component was to take up management time and approximately 10 percent of project costs over the next 3-4 years. Ultimately, it was not operational.

The idea for the component grew out of a series of discussions held during 1977 among various parties in Senegal, France, and the United States, which included the following:

- the Senegalese Government organization for scientific research (DGRST) and SAED
- AID and its French equivalent, Fonds de l'Aide et de la Cooperation (FAC)
- the French (private) Company Société Française des Etudes Thermique et de l'Energie Solaire (SOFRETES)
- Thermo Electron Corporation, a U.S. firm specializing in heat transfer technologies

In late 1977, Thermo Electron and SOfRETES jointly submitted a formal "Proposal to the Government of Senegal: A Solar Thermal Water Pumping System for Bakel, Senegal." The Government requested that AID finance a major portion of the Thermo Electron costs and obtained financing from FAC for SOfRETES. Following a strong AID policy at this time regarding renewable energy sources, AID/Washington in particular strongly supported the component. It was added on to BSIP in mid-1978.

Although the pump was designed to provide enough water to irrigate 200 hectares, by 1982 it was conceded that it would be able to irrigate only 32 hectares at top efficiency. Unfortunately, top efficiency could only be obtained by ensuring that the glass collector panels situated on the roof of the project headquarters remain dust free. Given the location of Bakel on the edge of the Sahara, it became obvious that top efficiency could never be achieved, and in early 1983 all work ceased on the pump. The panels remain as roofing for headquarters, and a small diesel pump costing perhaps 1 percent of the solar installation provides water for the base.

## 6. FISHERIES

Based on positive results of a 2-year effort in the Dagana and Podor irrigated perimeters, in 1982 BSIP took on a village fish ponds component. The rationale behind the component was that because water was being pumped from the river for irrigation, some of it could be used to maintain the ponds and provide fish for consumption and income in the villages. The ponds were to be managed by the existing irrigation groupements, which would be assisted by Peace Corps Volunteers in techniques and management. Given that the fish in the Senegal River had never regained their predrought number, the fish ponds would meet an expressed need of the people.

The program was initiated in collaboration with the Government Department of Water and Forests rather than with SAED, but management was shifted to SAED in March 1983. The program--and BSIP funding--actually covered the whole Senegal River Valley, from the delta to Bakel. Three PCVs worked in the Bakel area, and two former PCVs were contracted by USAID/Dakar to oversee the work. Project reports indicate that by late 1983, 12 village ponds were under construction in the Bakel perimeters, each capable of producing 2-4 tons of fish per year.

AID funding for this component will amount to almost \$400,000 by mid-1985, when it may be picked up by Catholic Relief Services. At the time of the team's visit, one former PCV was still contracted to manage operations across the

riverine zone, and three PCVs were still working in Bakel. The program counts five fish ponds as operational, although none have yet had a harvest; problems cited include poorly bred fingerlings, poor siting of ponds on porous soil, lack of interest by the villagers, and too much villager interest in eating the fish too soon. A new group of PCVs is scheduled to arrive in July 1985 for training and eventual placement, and some are targeted for Bakel. Because of success at other sites, the program will be continued.

## APPENDIX B

### ORGANIZATION AND STRUCTURE

#### 1. SAED AND FARMER GROUP STRUCTURE

The Bakel Small Irrigated Perimeters (BSIP) project follows the usual outline of rural development projects. Administrative and logistic structures from the urban areas penetrate into the villages for the provision of goods and services, and solicit villager participation to achieve project objectives. In this case Soninke and Toucouleur farmers, who traditionally cultivated rainfed sorghum, have been encouraged by the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED) to plant irrigated rice, vegetables, and fruits in perimeters that have been established and expanded by both SAED and the farmers. SAED provides overall planning, guidance, equipment, inputs (seeds, fertilizer, pumps, parts, and fuel), credit, and extension, while farmers provide labor to use the above for increased production. Sale proceeds are used to repay credit on time. Together, they are to achieve a common goal: more efficient and increased rice, corn, and related food crop production. To deliver these goods and services there is a series of intermediaries at different levels, performing different functions between SAED headquarters at St. Louis and the farmers in Bakel (see Figure B-1).

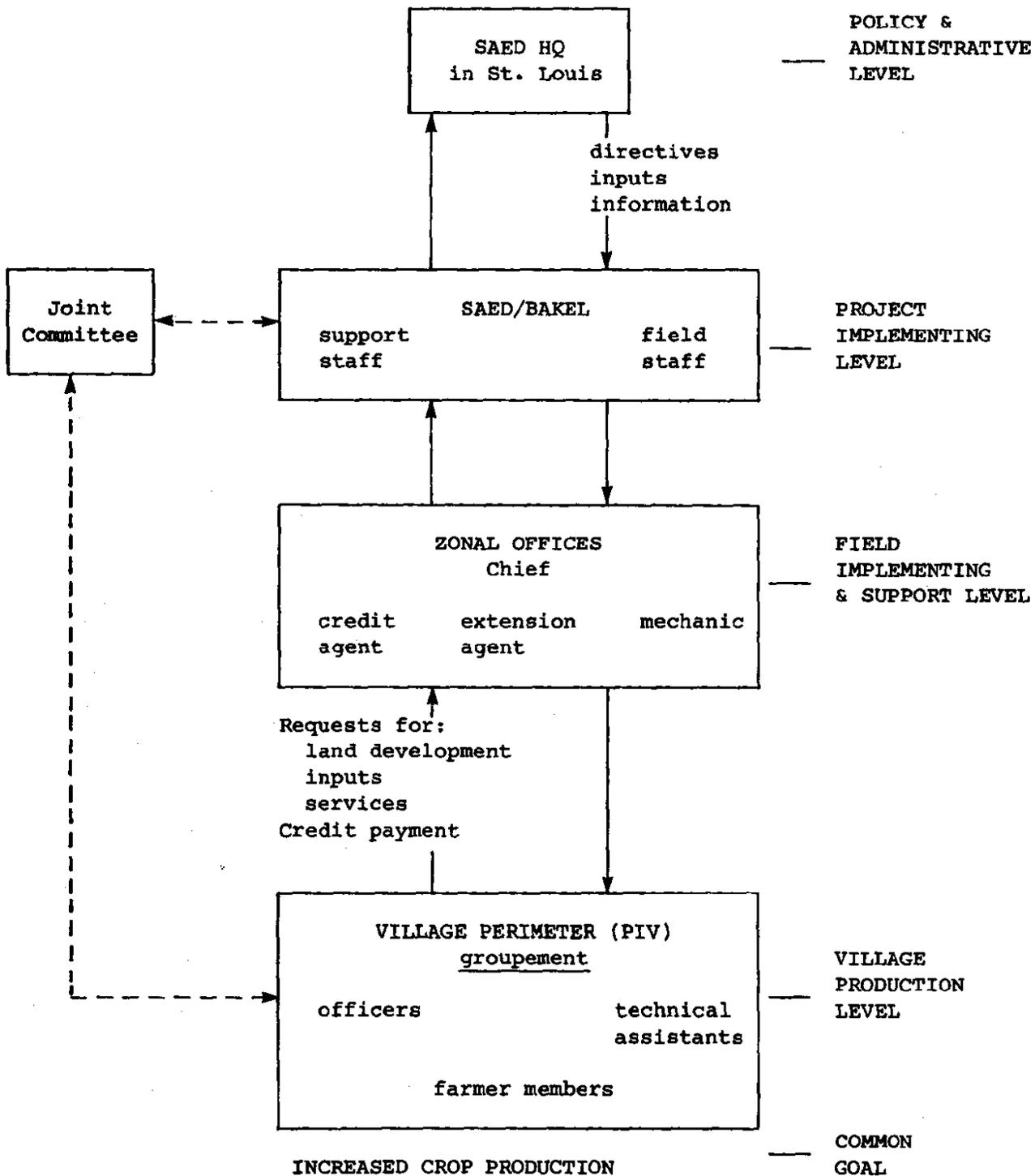
SAED headquarters is the source of the directives, implementing decisions, supplies and services, and logistic support for setting the conditions and provisions for farmer participation at Bakel. SAED management style has traditionally been top-down, issuing conditions and directives for farmers, and has been relatively unresponsive to farmer needs for diversified production, grievances regarding credit repayment, and demands for prompt delivery of goods and services. Recent policy changes have directed the reorganization of SAED to make it more responsive to farmer needs and to deliver inputs and services more efficiently. Appendix D discusses the structure and functions of SAED in detail--particularly as these policy changes relate to BSIP.

The next level in the project structure is the project headquarters at Bakel--a newly constructed complex of office, storage, workshop, and residence buildings.<sup>1</sup> The Bakel

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<sup>1</sup>The complex was designed to house a solar pump that was integrated into its construction. For reasons of cost and impracticality, further work on the pump was abandoned, and it remains incorporated as part of the roof (see Appendix A).

Figure B-1. Project Structure



Note: Solid line indicates established relationships; broken line, recent relationships.

headquarters lies roughly in the center of a string of 25 participating villages, which run in a northwest-southeast direction along the Senegal and Faleme Rivers. The distance between the extreme villages is about 150 kilometers, with laterite and dirt roads connecting the villages to the base. Travel is difficult during the rainy season.

The Bakel office consists of a director and his assistants, an accountant, a credit officer, and an administrative officer. There are also three divisions: extension, land management, and workshop, each with a chief and staff. Generally the director and his staff are responsible for organizing the groupements in the villages, explaining to villagers what must be done for land preparation, canal and dike construction, pump installation and use of other inputs, and terms of credit repayment. Once general agreement is reached on crops, hectarage, and number of participants, the agreement is approved at SAED headquarters in St. Louis, and, if needed, additional provisions are sent to Bakel.

The various divisions are then responsible for implementing the plan to open or extend the irrigated perimeters. Essentially this includes land preparation, dike and canal construction, pump and pipe installation, and planting and cultivation. SAED/Bakel engineers, operators, mechanics, and other technical personnel perform the heavy work with appropriate machinery, while farmers do the lighter work under their supervision. Once the perimeter is opened, they follow up their work with repair, maintenance, and extension training. Basically, then, the SAED personnel provide the overall direction, guidance, heavy maintenance, and machinery training for farmer participation in operating and extending the irrigated perimeters. The credit officer is responsible for collecting all village debts and the accountant for recording these and the provision of equipment, parts, and fuel from St. Louis.

The next level in the project structure comprises the three zones, which contain roughly the same number of villages. The zone staff serve as key intermediaries between the Bakel headquarters and individual groupements. Each staff consists of a zone chief, an assistant, an extension worker, a credit officer, and a mechanic. Each also has an office building (with radio communication to Bakel), a warehouse for inputs, and possibly a motorscooter, or more likely, access to one. The zone chief is supervised directly by the director at Bakel, and he in turn supervises his staff. The individual staff members also receive assistance, support, and advice from their respective counterparts at Bakel, particularly during fieldwork in the perimeters.

The zone chief is key to the operations of the project. The three chiefs were impressive field managers with substantial training experience (see Appendix F). Each is essentially

responsible for opening up or extending the perimeters and supervising their maintenance and operations. Once a zone chief has gained an agreement to open or extend a perimeter, he details and confirms the plan with the director at Bakel. Then he supervises the zone-level mechanic, credit officer, and extension officer as they perform their respective assignments with the farmers or with their counterparts at Bakel headquarters. The zone chief submits monthly reports to the director regarding progress of perimeter construction, farmer cooperation, production levels, credit repayment, and delivery of inputs. He also notes personnel problems among his staff or in staff relations with farmers and physical problems with water supply and maintenance.

The chief's assistant, the extension worker, performs the details of field inspection, gathering requests for inputs, noting complaints, and training village extensionists. This individual also carries out extension activities directly with farmers, often supported by the Bakel-based extension workers --two of whom are U.S. technicians. The extension worker also orients and trains village officers. The zone-level mechanic assists in the installation of the pump, inspects it occasionally, and repairs it or seeks assistance from the base mechanic. He is supposed to follow up training to pump operators, but this is rarely done. The credit officer, in the words of one chief, is a "businessman" who ensures the delivery of inputs and collects credit payments from villagers for inputs. He delivers no training but is expected to maintain complete records on credit payment.

The biggest problem of zone staffs is transportation. Although they are given small travel allowances, they are supplied with no vehicles. Travel to villages requires use of their own vehicle, a borrowed one, or a commuter bus that tours the area. Thus, although village visits do occur, they are irregular, with villages farthest from the zone station receiving the fewest visits.

Clearly, then, only a minority of villagers actually participate in the perimeters. In 1980, one sample indicated only 7 percent, whereas another study in 1983 conducted by Bakel staff indicated 14 percent of villagers participated.<sup>2</sup> Naturally there are extremes, with 100-percent participation in a few villages and none in others. It is difficult to determine exact numbers of beneficiaries because some plots are for individuals and others for whole households.

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<sup>2</sup>Richard P. Miller, "Peasant Autonomy and Irrigation: Innovation in the Senegal River Basin," Ph.D. Thesis, Northwestern University, 1984, p. 236.

At the village level, the key managing unit is the groupement. The groupement is the production unit for the perimeter operations for land preparation and water maintenance. Theoretically, it is the debt-paying unit for settling accounts with SAED for farm inputs. In some cases, the groupement is the work unit for collective cultivation, but for the most part the core cultivating unit is the farming family or individual members. (This is explained in detail in Appendix C.) Basically, the groupement is the managing unit of the perimeter for land preparation, water maintenance, and debt payment.

There is considerable variation in groupement structure and operations (this is also detailed in Appendix C). Generally, each perimeter has one groupement, but a few have more than one, especially those that have expanded their holdings. In some cases, the groupement is divided into subgroups, each of which takes turns, by schedule managing the distribution of water or maintenance of dikes and canals. In other cases, the subgroups have separate but reinforcing tasks for construction, maintenance, or repair. In still others, subgroups form and dissolve as the need arises. There are also differences in size and function of groupements between the more collective Soninke and the more individualistic Toucouleur. Nevertheless, the managing unit is the groupement, but there are considerable variations in terms of size, cultural background, and function, all of which influence how the groupement operates.

Each groupement is supposed to have a core managing unit, to include the following:

- President: the key intermediary between SAED and groupement members; attends to general problems and decisions, usually regarding land distribution and water usage
- Vice-president: substitutes for the president in the president's absence
- Secretary: attends to specific problems, such as expediting the delivery of inputs
- Treasurer: collects farmer debt repayments and (sometimes with an assistant) gives them to the SAED credit officer
- Storekeeper: receives, stores, and disperses the inputs
- Pump Operator: operates the pump and may perform minor repairs
- Extensionist: assists farmers in water delivery and cultivation techniques

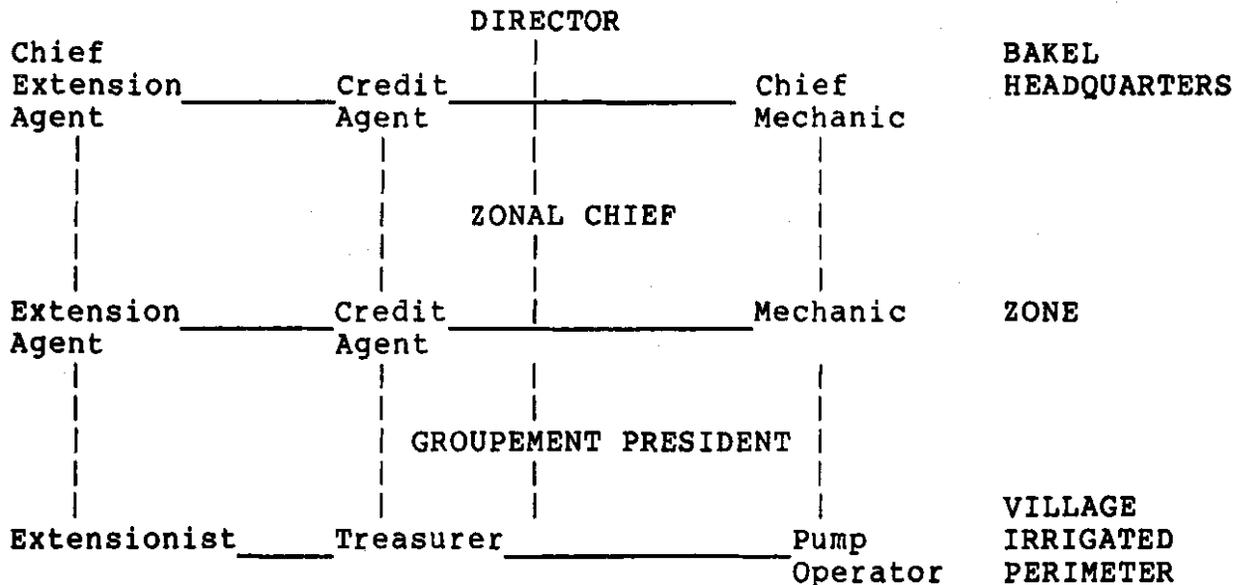
There is variation in the number and incumbency of these positions. One very organized perimeter had all of the above positions plus an advisory committee to the president and numerous specialists to help with water delivery and field maintenance (e.g., fence construction to keep animals out of the perimeter). Most perimeters had only a president and treasurer. Some perimeters, however, had a managing unit comprising all of the above.

Incumbents of these positions, particularly the president and treasurer, are likely to remain in their positions. The village chief may ask them to assume their position, or this is decided informally by group consensus. These incumbents are usually close to the center of village power, because they are likely to be relatives of the village chief, particularly the president. They are usually older and more committed to life in the village and are less likely to seek work beyond the village than are the pump operator and extensionist, who tend to be younger. Consequently, there is continuity in the incumbency of these positions, and they appear to carry some prestige as intermediaries with SAED functionaries.

There is greater turnover of pump operators and extensionists. The pump operator, and sometimes the extensionist, theoretically receive about \$30.00 a month in salary for their services, but even in the best organized perimeters they rarely receive this. More likely, they receive extra water or have their farm plots prepared as compensation. These incentives do not appear to be strong enough to keep them in their positions.

Thus, there exists a management structure, however loose and varied, with a reinforcing vertical linkage at three levels and horizontal coordination at each level. Vertically, four key positions are represented with different but homologous functions at the three levels of the project base, the zone, and the village. Horizontally, a resident manager coordinates duties among the positions at each level. This manager is the key intermediary in maintaining operations at each level and in facilitating relations between them. This is the core structure through which the SAED bureaucracy attempts to direct farmer operations and provide them with machinery, inputs, and extension services, and through which farmers express their needs and provide their support. This may be represented as depicted in Figure B-2.

Figure B-2. Key Positions in Project Implementation



In the past, the vertical relations have been very much top-down, with SAED issuing directives for water management and cultivation for farmers without much response to farmer wants and needs.

SAED was authoritarian, highly centralized, and primarily concerned with imposing its own master plan on the rural populations. It seized land, displaced populations, and relied heavily upon capital-intensive machinery to achieve its objectives. It had little interest in promoting a dialogue between itself and the rural populations.<sup>3</sup>

This has changed recently with SAED allowing greater farmer freedom, particularly regarding crop diversification. More important, recent policy changes (see Appendix D) have established at the project headquarters level a joint committee. This consists of five SAED staff from Bakel and five farmers--usually groupement presidents chosen by the 28 groupement presidents in the project area. The purpose of this committee is to discuss and review major actions associated with the opening and expansion of perimeters, input demands, and grievances; however, decision-making lies with the SAED staff.

<sup>3</sup>Miller, p. 56.

## 2. FARMER RELATIONS BEYOND SAED

The farmers believe that the key resource in crop production is SAED. Nevertheless there are other resources, particularly an indigenous organization founded by the farmers themselves, that provide alternative assistance to farmers. Briefly these are Government of Senegal technical personnel, marketing outlets, and the Soninke Federation.

Most extension activity occurs through SAED. However, extension agents from the agricultural service do assist farmers during epidemics of crop diseases or spread of pests. This may entail visits to the afflicted fields, the spraying of crops, and instruction to farmers on methods to prevent the spread of pests or diseases. Occasionally, these agents also will demonstrate ways to control bird pests. The Government research and extension services also provide farmers (through SAED) with improved seed varieties for rice, corn, sorghum, millet, and with supplies of vegetable seeds. In addition, one of these services inspects the regular supply of seeds that SAED sells to farmers to ensure they are suitable and undamaged. In the past, farmers occasionally rented graders for land preparation when the service was unavailable from SAED. Now that this service is provided more regularly and promptly by SAED, farmers deal only with SAED.

SAED used to demand that farmers sell their surplus crops to it according to the official Government price in repayment of debts. Farmers rightly chafed under this demand, because the official price was usually lower than market prices. During the 1970s, they largely ignored this restriction and sold whatever they had to each other, to other villages, to bush merchants, in the main market of Bakel, or across the river in Mauritania. In the 1980s, as a result of SAED's decentralization policy and complaints from the Soninke Federation, farmers sell surplus crops on the open market. Most transactions occur informally between villagers, although the other mentioned outlets may be used. (See Appendixes D and E for further discussion.)

Finally, within the project area, the Federation of Peasants in the Soninke Zone of Bakel plays a role in the project. The Federation in the broadest sense is a mutual aid association representing Soninke interests vis-a-vis SAED. Currently it comprises 11 groupements of 9 villages and the town of Bakel. It provides a forum for expressing grievances against SAED and proposing alternatives for crop production to those actions proposed by SAED. It was founded by the same individual who over 10 years ago introduced to Bakel the cultivation of irrigated agriculture using pumped water (see Appendix A). The

Federation's general purpose was to facilitate village-level coordination and solidarity in the pursuit of irrigated agriculture.

Today the Federation is not as active as it was in the past, and groupements vary in their support of the Federation. This is mainly because farmers are more satisfied with the activities of SAED--as noted in the discussion of the convergence of SAED and farmer objectives. Hence, farmers do not need to resort to an outlet to represent their interests and grievances, which theoretically is now done through the joint committee. In the past, however, Bakel farmers had reason to seek alternatives to the authoritarian, arbitrary, and exacting demands of SAED. During the early years of the project farmers confronted fixed crop choices, increased debt, tardy input deliveries, and a general exclusion from decision-making with SAED.

Thus the Federation began as an association to voice Soninke interests regarding irrigated agriculture. Its charter embodied several key concerns regarding its relationship with SAED:

- The Federation collaborates with SAED, but without compromising its autonomy.
- It looks to SAED mainly for technical assistance.
- Groupements can seek outlets other than SAED for purchasing inputs and selling their harvests.
- Groupements cannot be forced into debt by SAED.
- Groupements reserve the right for collective cultivation without SAED obliging them to follow individualized cultivation.<sup>4</sup>

Generally, farmers have realized these objectives, partly because of the Federation's efforts. The Federation received mild support from foreign donors, France supplying it with three rice hullers and a tractor and AID technicians meeting regularly with Federation leaders during the confrontations with SAED. In fact, the Federation's opposition to SAED appeared to have stimulated another village in 1982 to seek credit outside of SAED.

The Federation, however, has never received formal recognition from the Senegalese Government or SAED, although this has been a paramount objective in its dealings with the

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<sup>4</sup>Miller, p. 104.

Ministry of Rural Development. It persists in this effort today. With SAED becoming more amenable to farmer demands, however, farmer support of the Federation has waned.

### 3. SAED-AID RELATIONS

Overall, SAED-AID relations are characterized by detachment, aloofness, and loose coordination. This has been particularly the case between the AID project manager in Dakar and his contacts at SAED headquarters in St. Louis and between the AID project manager and AID contract technicians in the field in Bakel. This has resulted in misunderstandings, confusion, and difficulties between AID and SAED, especially regarding long-range planning and procurement (see Appendixes D and E for detailed discussion). Another result is resentment among AID contract technicians at Bakel, who have wondered how much support they really have. These same technicians also have been confused over their role with SAED project staff at Bakel. Were they supposed to have counterparts or were they supposed to act as quasi-SAED functionaries? Perhaps, because of (or despite) the detachment and looseness of AID's relationship with SAED--and the resulting confusion of AID field technicians--the technicians used their own resources, became fully accepted by SAED functionaries and farmers, and performed remarkably well under difficult conditions in implementing the project.

AID tends to implement most of its projects through host country representatives. In this case AID looked to SAED, which had been represented in the Bakel region since the mid-1970s, to provide a conduit for its irrigation development funds. However, over the course of the project, the relationship between AID and SAED has been unclear, resulting in delays and difficulties during the early years of the project. Indeed the Water Management Synthesis Report No. 9 focused on this in 1981:

Management problems affected the project as a whole... AID and GOS [Government of Senegal] through SAED have been unable to establish an effective counterpart relationship.... There is serious confusion over the respective roles of the AID technicians, the AID project manager, and the SAED project director.... Lines of authority are mixed. It is not always clear who is in charge and who should be carrying out which tasks (pp. viii, 10).

This confusion persists among AID contract technicians at Bakel, although not to the degree noted above nor with the expected debilitating effects on performance. The technicians were not quite sure of the AID project manager's role in Dakar.

Was he the procurement agent for AID-supplied commodities? Was he a technical backstop to supply information, advice, or goods when needed? Was he providing administrative support? Poor, even minimal, communication between Bakel and Dakar reinforced this confusion.

The biggest problem was whether the technicians were counterparts to SAED staff or part of SAED. As AID contract employees, the technicians expected to have counterparts so the technicians could provide advice and example without compromising their autonomy. SAED senior staff, as a matter of policy, however, expected the technicians to take key positions within SAED and operate as SAED functionaries. Until 1982, SAED project directors treated the technicians as functionaries, giving instructions rather than listening to them, and in some cases restricting their travel to irrigated perimeters. The dynamic manager in 1982 (see Appendix A) changed this, gave the technicians more autonomy, and encouraged them to take more initiative. His replacement at the time of fieldwork for this study appeared to be continuing this policy. However, neither of the two technicians at this time have definite counterparts, although both were in charge of their respective and key operations: construction and water management, and extension.

The AID contract technicians have had to cope with this confusion over their roles and its resulting tension. They coped well, however, and forged their own roles by combining both aspects. The Chief of Party in the late 1970s was supposed to be an extension leader. While he organized extension activities, particularly the demonstration farm and plots, he also served as a useful intermediary between AID and SAED, and SAED and the farmers. "Following a particularly difficult meeting in which certain Federation members challenged the integrity of the president and thus threatened his position, USAID contract technicians intervened to help insure that the existing president would maintain his position."<sup>5</sup> Thus, through a conscious effort by AID technicians, a good working relationship and mutual trust was established between farmers and AID.

Two other AID contract technicians took the initiative in providing key leadership in their respective operations while remaining in line positions in SAED (see Appendix F). Both managed to introduce sound management and extension techniques with assistance from their SAED staff but still take instructions from the SAED project director.

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<sup>5</sup>Miller, p. 122.

## APPENDIX C

### ADMINISTRATIVE PROCESSES

#### 1. SUMMARY AND OVERVIEW

As noted in other appendixes, the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED) has undergone several policy and organizational changes during the course of the Bakel Small Irrigated Perimeters (BSIP) project. One of the most important of these changes is the increasing recognition and support of the village-level groupements (working groups) as management entities. The current emphasis is on creating autonomous perimeters of an increasingly larger area, managed by one or more cooperating groupements on a 50-hectare modular basis. Technical or material support from SAED would be minimal, with groupements or associations of groupements dealing directly with fuel suppliers, banks, and processors/traders. The following sections examine how the groupements currently handle administrative and organizational processes and raises issues concerning preparation for a more complex future role.

#### 2. JUDGING GROUPEMENTS' SUCCESS

BSIP encompasses several levels of direction, including USAID/Dakar, SAED/St. Louis, SAED/Bakel, village groupements, and individual farmers. In attempting to determine which administrative and organizational practices or procedures have led to successful management, it is necessary to examine each of these actors' points of view.

##### 2.1 USAID/Dakar

USAID/Dakar internal reports and reviews/studies generally do not examine the groupement as a key managerial unit. Most reports note the number of villages participating or the number of irrigated perimeters created as project outputs; production is rarely related to the groupement level. With the exception of the Water Management Synthesis Project (WMSP) review of 1982, production is generally related to either land area or to individual farmers. The WMSP review looks at groupement management theoretically, using research from Hyderabad, India as a model, and concludes:

As long as the perimeters are relatively small (20-100 hectares) and they are run as one management unit using scientifically and economically sound practices, traditional social organization and process should be relatively efficient. It appears to be more efficient than either a western style consensus model or a centrally managed and operated state farm, as has been tried on other Senegal River perimeters.... The present high degree of local perimeter self-management is offset by a void between groupements/federations and SAED-AID management.

## 2.2 SAED/St. Louis

SAED/St. Louis has consistently viewed the groupement as a key management unit. In the early years of the project, it seems that the groupements were viewed as organizationally useful entities for labor management and as administratively useful entities for credit liability, but not as real project decision-makers. An annual contract from 1976-1977 notes specifically the roles of SAED and the groupement regarding land preparation, obligations vis-a-vis the pump, responsibilities in agricultural production, methods of marketing, and credit payment responsibilities and procedures. The only specific requirements set by SAED for internal organization and administration were (1) a definition of the roles of the president, treasurer, and pump operators and (2) recognition that the entire groupement assumed liability for credit repayment. SAED essentially assumed most of the decision-making role, establishing conditions for repossession of pump-sets if, for example, villagers did not follow the agricultural calendar (including which crop to plant when) established by SAED, did not cultivate at least 10 hectares, or did not repay debts.

Much has changed over the years. SAED/St. Louis now follows a stated policy of recognizing real decision-making and authority at the groupement level, moving toward fully functioning autonomous perimeters by 1987. Individuals and groupements determine which crops they will plant and to whom they will or will not market based on their needs. SAED/St. Louis has decreed the establishment of joint committees throughout the region, and the villagers of Bakel are cautiously, but apparently optimistically, participating.

SAED/St. Louis thus appears to view as successful groupements those that are demonstrating increasing responsibility for all phases of production, relying less and less on SAED, and that are also increasing gross production each year. Part of

this increasing responsibility implies increasing credit repayment, an emphasis that in the team's view is encouraging for project sustainability.

### 2.3 SAED/Bakel

SAED/Bakel, which includes the American technicians working therein, has had the most detailed knowledge of internal organization and administration of groupements throughout the project. In the early years, while executing St. Louis' top-down and rather heavy-handed policies, relations were strained and groupements were categorized either as "at war" with SAED or "good," generally meaning cooperative. With the major policy and upper-level management changes in 1980-1982, more objective and consistent criteria were established. During the 1983-1984 agricultural campaign, SAED cut off credit to the 11 villages of the Faleme Zone for several months because of their stated refusal to repay. As of the team's visit, two villages were still not receiving SAED's assistance because they had not even attempted repayment. SAED/Bakel has also worked with groupements to ensure that adequate levels of inputs, notably diesel fuel and fertilizer, were in position prior to the rains, leaving the quantities to be decided by the groupement officers. During the last 2 years, SAED began to acknowledge that the legitimate holders of authority for work in the perimeters were the groupements rather than SAED. Currently, SAED/Bakel criteria for successful groupements appear to mirror those of SAED/St. Louis.

### 2.4 Groupements

From the project's beginning, the perimeter groupements have assumed their legitimacy and authority and acted accordingly. It must be stressed that half of them had organized and undertaken successful activities prior to SAED's arrival in Bakel; they did not share SAED's view of itself as their creator. When SAED became too heavy-handed, the groupements either circumvented the obligations (e.g., by claiming grain for consumption to avoid having to sell surplus at SAED's low price) or ignored them. When SAED/Bakel got too demanding regarding the groupements' relationship with SAED vis-a-vis other organizations, they independently complained to the president's office in Dakar. The new SAED policy on increasing the responsibilities of the groupements reflect what the farmers have believed all along.

Success in groupement terms appears to be based on at least three criteria: (1) high enough production to meet members' needs; (2) freedom from disputes, either internally or with SAED or other agencies; and (3) keeping down the costs of production. On the first point, there has been an increasing emphasis by individuals and groupements on diversification of field crops (e.g., irrigated rice, maize, and sorghum), vegetables, and recently, fruit. This diversification appears to stem from a combination of the household and individual desires for decreased risk, for increased and varied consumption, and--with fruit--for increased income. Particularly with the drought of the last 2 years, villagers, SAED technicians, and informed expatriates stressed the importance of irrigated culture to household subsistence.

On the second point--freedom from disputes--groupements vary considerably but tend to reflect cultural norms. The Soninke have chosen men from well-respected families as groupement officers and exhibit confidence in their actions. There is less need for widespread and frequent group meetings and participation in Soninke groupement decisions, although all Soninke presidents interviewed stated that they held general meetings each time they met with SAED or incurred a debt on members' behalf. Most Toucouleur presidents are also traditional nobles, but the culture has the reputation of being much more individualistic. This characteristic is reflected in more frequent leadership changes among the Toucouleur. Formal designation of "who is in charge" appears less important than allowing all members to have their say. Both groups tend to view the years of dispute with SAED with dismay and the need to consult higher authorities as unfortunate and time consuming.

On the third point, the need to decrease costs of production on a groupement level, as distinct from a household or individual level, appears to be gaining in importance. Although accurate time series data were not available to the team, it appears that groupement officers are increasingly interested in achieving higher repayment rates, at least for short-term production credits for diesel fuel and fertilizer. The officers interviewed who expressed this interest believe that the best way to increase repayment is to decrease the cost of these inputs to the groupement, particularly the communal cost of diesel fuel. Several officers and technicians discussed the benefits of cementing primary and secondary canals to reduce water percolation and loss, thus decreasing the amount of water to be pumped, as one example of how to decrease costs and thus improve groupement chances of keeping up with the debt. This interest probably stems from ongoing dialogue with SAED officials and concerns expressed by individuals over the production costs.

## 2.5 Households and Individuals

The individual farmers want to maximize or optimize production within their household economies. That is, although initial pre-SAED efforts seem to have focused on collective endeavors for village development, over time most groupements have reallocated land to households or individuals and emphasized collective work only on tasks necessary to run the perimeters (e.g., canal maintenance and water distribution). Individual farmers can plant what they want; apply fertilizer in amounts they choose; and harvest, market, or consume on their own terms. Labor is allocated within the household economy, and the hiring of labor either on a sharecropping or wage basis is viewed as totally acceptable. Repayment of the debt is done through individual prorated cash assessments, with peer pressure apparently the primary means of enforcement. At least two perimeters are allowing persons from other villages, some as far as 7-8 kilometers away, to participate on new enlarged irrigable land. Equity within the existing village structures appears to be maintained.

In sum, the common definition of a successful groupement is one that allows individuals or households to maximize income after subsistence needs are met and does so in a way that minimizes demands for time or money on the individual, household, and SAED.

## 3. PERIMETER ADMINISTRATIVE MANAGEMENT: PROCESS AND PROBLEMS

Although some of the early BSIP literature tends to imply that groupements are monolithic entities, they vary considerably in role and strength. Organizationally, they tend to provide a focus for self-selected participants to cooperate in decisions and tasks necessary to support cultivation of individual plots. Administratively, they serve an important function both for planning, executing, and monitoring individuals' contributions (cash and labor) and for maintaining external administrative relationships with SAED and other institutions. These functions are reviewed below.

### 3.1 Land Clearing and Preparation

Although several of the current perimeters began prior to SAED and the initial hectareage was cleared by manual labor, most farmers have spent one or more seasons engaged in collaborative

land preparation of a new or extended plot. This work generally is viewed as separate from ongoing perimeter operations and management and often results in special efforts at organization and training to carry it out.

In essence, the groupement plays the role of management and labor in land preparation for new perimeters or extensions of existing ones. Generally, officers and/or key leaders meet several times with SAED/Bakel engineering staff before the work season, discussing and reaching consensus on location of the land and the pump site, probable location of primary and secondary canals, and needs vis-a-vis individual/separate plots for planning bunds and dikes. A general framework for the effort is defined in the contract, and from this framework the participants reach further detailed agreement on specific roles for SAED and the villagers and on desired scheduling of the inputs. Communication is maintained primarily through frequent verbal contact as work progresses. Should SAED be unable to meet its commitment--if, for example, a piece of equipment is under repair--the village is notified and a new schedule made. Should villagers not meet their commitments, SAED may shift the village to the end of the list and move elsewhere.

Most groupements organize specific subgroups during this time to undertake either specific tasks or all tasks on a specific area. In some groupements, these subgroups are maintained for subsequent communal management and labor needs (e.g., canal weeding and maintenance and water distribution). In other groupements, the work groups disband after land preparation and may or may not regroup for maintenance purposes later on. All groupement members must participate in this work, and fines are levied for individuals or households that do not meet labor requirements. Given generally over 5 years of experience with SAED and one or more seasons of this type of work, each perimeter appears to have evolved a style of management that meets the needs of the terrain and of the groupement.

A continuing issue with new land preparation is the desired mix of mechanized and manual labor. SAED/Bakel is in a difficult position. Both SAED/St. Louis and villagers tend to view quantity of hectares opened as a major and key output, and quality of work undertaken--particularly of manual leveling--as less important. At the time of the team's visit, the office had one bulldozer and one scraper operational and working well over 8 hours a day. Much leveling was being done by hand to meet hectareage targets. Villagers and technicians know well that scrapers can do primary work faster and more efficiently. It is suggested that if the current high quantitative targets are kept, SAED/St. Louis might investigate instating a modified mechanical/manual combination for future efforts.

### 3.2 Operations and Maintenance

Ongoing operations of the perimeters include canal weeding and earthwork maintenance and repair; attention to pumps and ancillary equipment (e.g., pipes and headworks); actual cultivation, including planning, scheduling, and applying various inputs; water distribution; harvesting and marketing or storage; and payment for goods and services incurred during all of the above. These activities may be further disaggregated as follows:

- Activities for which the groupement assumes collective responsibility and authority--often through its officers. These include canal and earthwork maintenance and repair; care, maintenance, and operation of the pump or pumps; and repayment of credit to SAED.
- Activities that require close cooperation between the groupement as a management entity and the member-cultivators as individual farm managers. These tasks are water distribution and repayment of the loan to SAED.
- Activities for which individual cultivators are responsible. These include crop cultivation, individual parcel preparation, use or nonuse of technical assistance, use or nonuse of improved seeds and fertilizer, weeding, harvesting, and repayment of the debt to the groupement.

Overall, after 8 years of experience, the roles and responsibilities of individuals, groupements, and SAED now appear to be well established in policy and practice. All three parties will need to continue close cooperation as technical and managerial needs become more sophisticated because of increased hectareage and number of participants per perimeter.

#### 3.2.1 Groupement Management Activities

Requirements for canal weeding and earthwork repair and maintenance are taught to groupement and subgroup leaders during land preparation and are reinforced by SAED/Bakel zonal and central extension staff throughout the year. Most groupements appear to have scheduled group or subgroup work days, 2 or 3 days per week in season, to perform these tasks. Again, all members must participate and fines are levied for absences. Several groupements reported trying alternative approaches to this communal work requirement over the years, including varying the size and area to be worked by subgroups. Most appear to

recognize the value of canal maintenance for efficient and cost-effective water distribution. It appears that continuous on-the-job training and monitoring by SAED/Bakel will help improve the results over time, particularly as perimeters are enlarged and more farmers are dependent on primary and secondary canal efficiency.

The groupement is also responsible for the care, maintenance, and operation of the pump or pumps, although this responsibility is generally undertaken by the designated pump operator and one or more key leaders or officers. Pump operators receive very basic training twice yearly from SAED/Bakel--checking oil levels, cleaning air and diesel filters, refueling--and are expected to maintain logs on pump operation. They are supervised by the officers, subject to sanction by the groupement, and accountable to SAED zonal and central pump mechanics. They may recommend the purchase of spare parts, but it is usually the groupement president or other leader (i.e., vice president or village extensionist), in consultation with the Bakel mechanic, who makes the decision to purchase the part and incurs the debt on behalf of the participants. In return for their work, they theoretically receive payment by the groupement, in cash and/or in kind. In reality, it appears that pump operators have an extremely high turnover rate, and pumps are often operated by untrained persons. Also, pump operators may not be paid for months at a time, which may account for the high turnover rate. Given the absolutely critical nature of the pump in the overall irrigation system, it is imperative that SAED and the groupements work together toward better recruitment, training, and incentive procedures to ensure that competent pump operators are hired and retained.

Finally, the groupement assumes the liability for the debt with SAED. Both parties are aware that, because of the decreasing cultivation of collective fields in recent years, the groupement has only limited funds--primarily from fines--at its disposal to pay the debt. Both parties are also aware that the payment thus depends on the abilities of the groupement officers to maintain credibility and obtain individual assessments from participants. In perimeters that maintain a collective field--the largest being 9 hectares in a 102-hectare plot, with over half of the groupements maintaining none--the proceeds of sales from the collective field are used to pay as much of the debt as possible. The remaining amount (and the total amount in the perimeters with no collective field) is paid either through collection from individuals of prorated shares as noted above or through collection from individuals based on use of specific inputs. Both forms of collection require a high degree of trust in the groupement officers making the collections.

To date, the credibility of the officers has been maintained primarily through ensuring that officers are well-respected village leaders in the traditional sphere, and that repayment is generally proceeding, however slowly. The officers are generally persons of well-regarded family in the village who have respected experience with the outer world (e.g., France). To date, their managerial skills seem to suffice. In some of the larger perimeters, however, there appeared to be a tendency of groups to choose a traditionally respected, often token, president to provide this credibility, with most operational decisions and activities being assumed by another officer or leader. Because of the increasing legal ramifications of group liability for the debt, SAED and the current leaders will need to monitor closely the qualifications for managers as future expansion creates more sophisticated needs. The traditional social acceptability is perhaps as important as technical or managerial competence in ensuring repayment.

### 3.2.2 The Groupement as Manager Versus the Individual as Manager

The most technically sophisticated and costly aspect of the irrigated perimeters is water distribution; it is also the most managerially complex. A trained technician, the pump operator, is essentially responsible for ensuring water delivery on time. Groupement or subgroup leaders are responsible for supervising the primary and secondary canal distribution, opening main diversion gates on time, and ensuring that individuals are ready to irrigate. The individuals must be in their fields ready to open their dikes for water when so ordered by the supervisors. Fines for stealing water, either during this process or at night, are severe.

Over time, individuals and groupement leaders have recognized the high cost of the water delivery system and sought to ensure equity in use where possible. The cost--estimated at 40-60 percent of the total costs of agricultural production--is shared among individual cultivators based on land units. Anyone with .25 hectares of maize pays the same as a person with .25 hectares of rice, and overutilization of water by either is discouraged. Particularly in villages in Faleme Zone, where water is limited, strict adherence to schedules and enforcement of fines are common. Although most villagers, when asked about organization, simply stated, "We've been working so long together we each know what to do," the rates of unauthorized irrigation as recorded in fines suggest a keen understanding of the value of irrigation.

Repayment of debt is also an activity requiring cooperation between individuals and the groupement. Although certain costs such as pump parts or diesel fuel are assessed on equal prorated shares, others are incurred by the groupement on behalf of the individual. Most farmers seem to pay the (low) cost of hybrid seeds at purchase, but it appears that groupements undertake a high degree of onlending for credit for fertilizer. That is, prior to the agricultural season, the groupement leaders record (or memorize) the individual requirements of each cultivator and place bulk orders with SAED. Inputs arrive at SAED/Bakel and are picked up by a groupement representative, often in a rented vehicle. They are stored in village storehouse where one exists and in other locations (i.e., officers' homes) where one does not. Individuals are contacted to pick up their orders and are theoretically encouraged to "pay as they go." When people cannot pay--which appears to be more often the case--the groupement assumes the individual credit on their behalf and collects later in the year. As SAED applies its policy of divesting its input supply services to the private sector, other suppliers will be making the decision on whether to extend the initial groupement credit. SAED should now work with groupement leaders on divising options for maintaining this onlending role while still ensuring credit worthiness of the groupement.

### 3.2.3 Individual Management Activities

Decisions and responsibility for field crop cultivation are left to the individual cultivators, subject to the groupement officers' provision of specific inputs and to needs as defined by their household economies. SAED technicians, at the zonal or central level, may work with farmers on a self-selected basis to help them determine these needs and to recommend seeding and fertilizer application rates. Village extensionists, serving on a voluntary basis, are also available for advice. Results of field trials at the demonstration farm are communicated to farmers verbally and in local language handouts.

There appear to be growing concern and potential conflict between this decentralized and individualistic approach to cultivation and the needs of the overall perimeter to maximize its production. Individuals who do not or cannot attend training or demonstration sessions may be reluctant to incur a debt for improved seeds or fertilizer. With lower yields, they then are understandably reluctant to pay their share of diesel costs, which are prorated on the basis of area cultivated without regard to crop or yield. With less at stake, they may also be less productive in communal labor requirements, as for example, in canal maintenance. Groupement officers must thus spend more time and effort chasing after debts and arguing about costs, as

well as arranging for group labor. Thus, there is sometimes conflict between the groupement's need to sustain the pumpset and headworks and maintain relations with SAED, and the individuals' needs to optimize household resources at the possible expense of the groupement. This situation is also a reflection of the shift from management based on traditional social cohesion to one that must recognize broader technical and financial needs for project sustainability.

This potential conflict of objectives between the groupement and the individual was suggested in early reviews of BSIP regarding perimeters with high participation by businessmen and bureaucrats who really did not pay much attention to maximizing production. Most recently, it is exemplified by one village that has formed a new groupement to manage and cultivate a new perimeter extension in the village. On the original perimeter, following Soninke tradition, women were allocated individual parcels for cultivation. These parcels were smaller than those of the men, because the man must provide the family with food, whereas the woman's return is for her personal needs. On the new perimeter, however, parcels will be allocated only to male heads-of-household, who can dispose of the smaller units of land as they wish. This shift was explained by the new groupement president as follows:

Women don't have as much time as men to cultivate due to their other burdens. They don't go to demonstration and training sessions, so they don't use fertilizer or good techniques. Their yields are low, and they don't want to pay the debt. The [old] groupement has had to designate a women's sub-group leader and treasurer specifically to try to collect from the women. They work less and are less productive than men.

Thus despite the apparent consensus on objectives, there appears to be a potential conflict between individual and groupement needs for production and equity. This problem is apt to grow as current perimeters are expanded and persons from other villages join existing groupements or as private entrepreneurs from outside Bakel begin to access irrigable land. Traditional social cohesion will be strained, and the delicate management balance will be upset. The criteria for participation in groupements and more specific responsibilities for individual members need to be discussed now, possibly in the new joint committee, before equity issues create conflicts that slow project momentum.

In sum, based on SAED statistics showing increasing yields per land unit and on the demonstrated eagerness of villagers to participate in new and enlarged perimeters, it appears that the

broad framework of a technical package for irrigated agriculture in Bakel has been developed and adopted. That in itself is no small achievement. For farmers, the groupement, SAED, and the Government to maximize their respective investments, however, much more attention to transfer of specific technology systems is required. If the Government and SAED retain the current commitment to widespread and equitable participation in modular, community-managed large perimeters, efficiencies in production will only be obtained through improved efforts at communal and individual management of these systems.

## APPENDIX D

### SAED: STRUCTURE AND OPERATIONS

#### 1. SAED TODAY

The National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED) has evolved from an over-centralized, poorly structured, top-heavy organization to one that is decentralizing its activities and responsibilities, and, more importantly, rationalizing its operations to fit national objectives for both parastatals and farmers. Its reorganization began formally in 1981 with the publication of the first Lettre de Mission, in essence, a contract between the Government of Senegal and SAED setting forth what SAED would accomplish from July 1, 1981 to June 30, 1984, and what assistance the Government would give SAED to these ends. The document recognized serious internal operating problems. The problems had arisen in part because of inappropriate organizational structure<sup>1</sup> and in part because of underqualified staff. The reorganization of certain activities and the progressive decentralization of other activities continued with the publication of the second Lettre de Mission in 1984.<sup>2</sup>

In short, the two Lettres de Mission grouped similar activities within SAED and rationalized certain activities, (e.g., centralized heavy equipment operations). As part of the rationalization process, SAED decentralized by setting up each regional division as a separate cost center, with a measure of autonomy and responsibility for its own costs of operation. The rationalization of operations and the progressive decentralization are evident in the transfer of certain responsibilities to farmers. As SAED becomes less of an implementing agency and more of a planning, research, and guiding agency, other SAED responsibilities will be transferred to farmers and the private sector.

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<sup>1</sup>Actually, in October 1980, SAED's 12 departments were replaced by 5 functional departments (i.e., planning, technical support, equipment, finance, and administration). Although there have been subsequent changes in some department names, the five fulfill the same functions today.

<sup>2</sup>This document further defines the evolution of SAED in the context of the New Agricultural Policy (Ministry of Rural Development, March/April 1984), the main objectives of which are to reduce Government financial costs and to increase agricultural production and productivity. Parastatal roles and responsibilities are to be reduced with a transfer of these roles and responsibilities to farmers and the private sector.

SAED's evolution is also evident in its philosophy toward the farmer. The philosophy has changed from one of directing the farmers' every move to one of allowing farmers to make their own decisions on crops, groupement organizational structure, and division of land between collective areas and individual areas. Although farmers have always made their own crop and land decisions, SAED now supports these actions and, in fact, tries to enhance them with technical and input/financial assistance.

### 1.1 SAED Finances

In 1981, SAED's status was changed administratively within the Senegalese legal system. The new status basically meant a greater degree of freedom in its operations and control over its own yearly budget, the principal sources of funds for which are the Senegalese Government and various donors. SAED has an annual program with specific targets. The Senegalese Government's Presidential Commission evaluates SAED's performance, as it does that of other national companies. SAED is accountable to both the Commission and to the Ministry of Finance. SAED's annual budget allocation is dependent on the past year's performance in meeting the established targets.

Even so, the past 2 years have been financially difficult for SAED. In 1982-1983 and 1983-1984, the Government's financial problems resulted in a cutback in Government allocations to SAED (see Table D-1).

Table D-1. Shortfall in Senegalese Government  
Contributions to SAED, 1981-1984  
(in million CFAF)

Sources of SAED Funding	Planned	Actual	Shortfall
Externally Financed Subsidies	2,645	2,645	-0-
Donor Equipment Subsidies	6,151	6,151	-0-
Government Budgetary Support	5,635	3,220	2,415
Government Operating Account Subsidy	5,512	1,944	3,568
<b>Total</b>	<b>19,943</b>	<b>13,960</b>	<b>5,983</b>

SAED reports that of the operating account subsidy shortfall, donors will make up CFAF 668 million, CFAF 975 million will be "transferred" into future operating costs, and

CFAF 555 million will be "cancelled." How the remaining CFAF 1,370 million plus the CFAF 2,415 million of unreceived budgetary support will be handled is unclear. SAED may have to absorb this.

SAED thus had to borrow from the National Development Bank at 12-percent interest and dip into its own capital to purchase inputs to supply farmers. Farmer credit was outstanding for 12 months and some farmers did not repay, factors that added to SAED's cash flow problems. In 1984, SAED was unable to get sufficient funds in time to purchase the entire 25,000-ton rice harvest. While the team was in Bakel, the Bakel Small Irrigated Perimeters (BSIP) project ran out of diesel fuel; BSIP was able to keep vehicles running and to generate power for its headquarters only through borrowing from other sources.

## 1.2 SAED and BSIP

Of the four regional divisions of SAED's production operations, Bakel was the last to be developed. SAED concentrated the bulk of its resources first on the Senegal River delta because it is the nearest to St. Louis (SAED headquarters), has large areas of flat land, and was the easiest to manage. Bakel, by contrast, is the farthest removed of the regional divisions and does not have large amounts of flat land characteristic of the delta. Thus, Bakel evolved very slowly. As late as 1983, it had no real office space of its own and the then current project director had to drive to St. Louis for spare parts. In fact, not so jokingly, it was called "Siberia." In earlier days, it was the place to which an employee whose performance was lacking could be posted. This is not so today, because the quality of current personnel has risen considerably over what it was reported to be in the past. Additionally, facilities are in place and in use. (See Appendix A for the details of BSIP's evolution.)

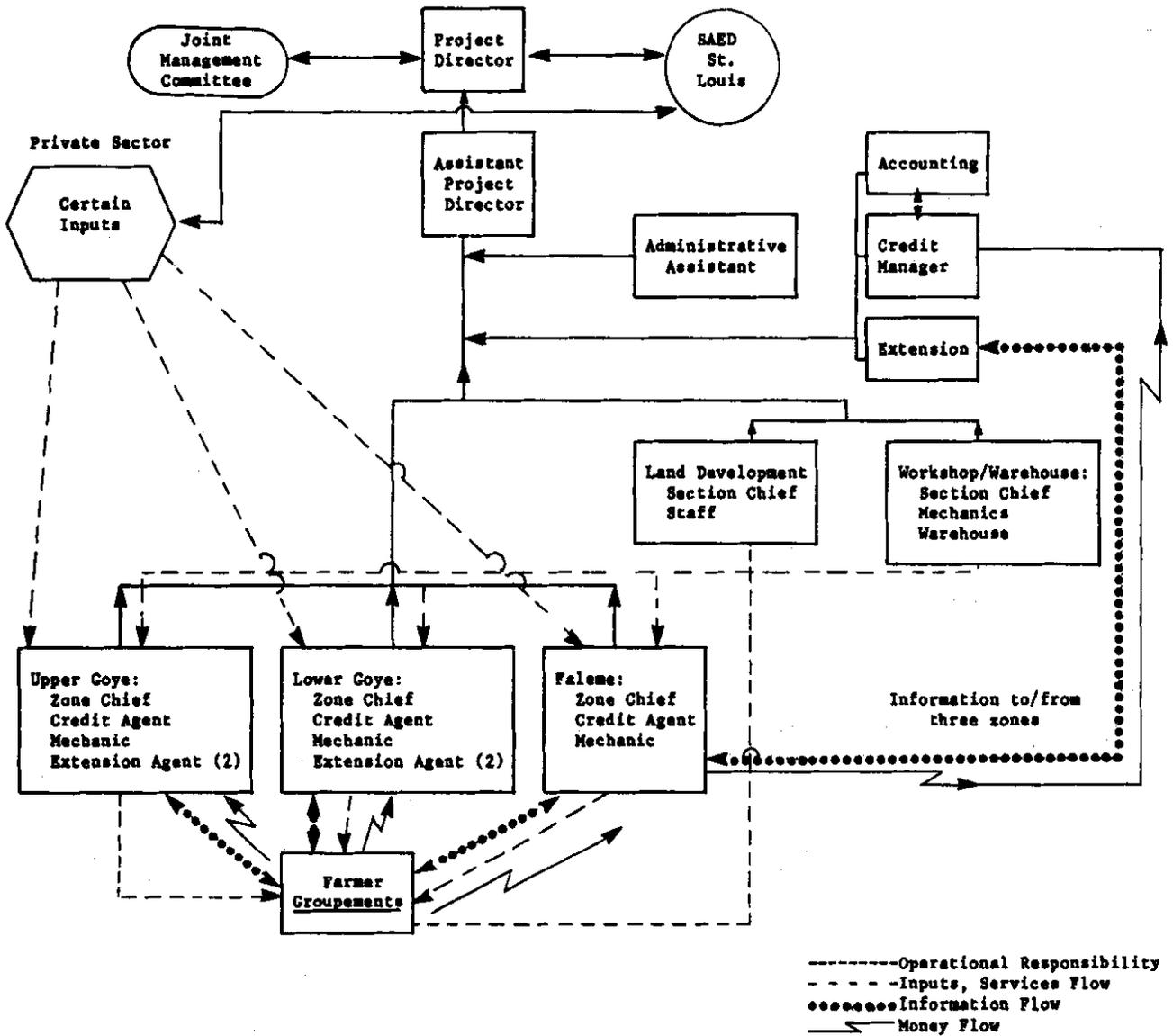
## 1.3 SAED Organization

SAED's current organization chart showing the five functional staff/service departments and the direct reporting of the regional divisions and other line operations to the President of SAED is displayed in Figure D-1.

The second organization chart (see Figure D-2) depicts the organization of BSIP, with its line and staff relationships and flows of services, inputs, information, and money. As an initial step in the transfer of responsibility to the farm community, a joint management committee comprising five elected members from the groupements and five SAED representatives was recently



Figure D-2. Bakel Small Irrigated Perimeters Project Organization



formed. This committee will eventually have complete responsibility for all agricultural production decisions, finances, negotiations with input suppliers, and internal problem resolution.

## 2. ADMINISTRATIVE PROCESSES

### 2.1 Management and Decision-Making

Changes in management style and decision-making largely parallel the evolution of SAED as an organization. Management style and how decisions are made are also functions of the personalities of top management--their educational, work, and cultural backgrounds.

As SAED has reorganized and become more decentralized, management style has mirrored these developments. This new management style may be characterized in the following ways:

- Concern for the future of the organization and its beneficiaries
- Increased sharing of responsibilities within the organization
- Delegation of responsibility within the organization
- A growing appreciation of the need for rational quantitative and qualitative tools to monitor and to bring about progress toward organizational objectives

For example, in the past, progress made in training farmers in irrigated agriculture was measured by yield and production increases. Little recognition was given to the fact that, in the short term, the tempo of agricultural production followed Government agricultural policies. When the price of fertilizer was raised, production dropped. Other more rational and appropriate measures are now used to measure training progress.

One factor that has not undergone as much change as others is the delegation of authority. In the early years of BSIP, one needed the unequivocal support of the project director to get the job done. This support was usually implicit in a standard and vertical activity (e.g., accounting). On the other hand, this support had to be actively won for the initiation of a new or innovative activity and for operations that cut across functional departments.

Responsibility without commensurate authority is a pitfall anywhere in the world. Responsibility without authority was best summed up in Bakel as "the more responsibility I have, the more problems I have. The more problems I have, the greater the chance of failure." Of course, this stifles any personal initiative, whatever the incentive. What is clear is that it takes time for a change in management style to filter down to the field. It takes time for human beings to change. This change has started to happen over the past several years at BSIP.

### 2.1.1 Setting Objectives

General SAED objectives appear to be to open as much irrigable land as possible, consistent with the overall agricultural goals enunciated by the Government. The opportunity perceived is to take advantage, to as great a degree as possible, of the quantity of water that will be available from the Diama and Manantali dams. The financial and physical resource constraints (e.g., pumps, land preparation, equipment availability), although recognized, appear to be relegated to a place of lesser importance in the calculation of the objectives. This is clear in the case of BSIP. SAED does not appear to appreciate fully the need to meet the more important objective of consolidating its gains in Bakel and, in so doing, to form a strong base from which additional lands can be opened and operated efficiently.

### 2.1.2 Planning for Implementation and Scheduling

Although one can rightly argue that not enough attention is being paid to other important objectives, such as ensuring that the already irrigated lands be both productive (high-yielding) and viable (self-sustaining) over the long term, the amount of land to be opened remains paramount in SAED's eyes. SAED wishes to achieve rapid quantitative increases in opening new land and believes that what USAID is willing to finance is insufficient. It is within the context of opening up land that setting objectives and planning for implementation at the BSIP level is explored.

A "bottom-up" management approach appears to be operative at BSIP from the level of the farmer to SAED/St. Louis. Briefly, farmer requests for opening new land are made through the zonal chiefs, the extension agents, and the technicians, as well as directly to the project director. This occurs principally during the rainy season (June-September). Once requests are accumulated, the project director, technicians, and zonal chiefs

discuss overall BSIP objectives within the framework of local priorities, characteristics of the lands desired to be opened (e.g., suitability for irrigation, amount of clearing needed, distance from water), and availability of BSIP/SAED resources. These physical and human resources factors are tempered by equity considerations (e.g., a village may have been denied a request in the past on the basis of unsuitable soils, but in fairness, the village should be given an opportunity).

The BSIP initial determination of how much land to open and where is followed by a topographical and soils analysis team study of the identified sites in September/October. Their work is followed by a series of meetings with the Planning and Development Department and the Equipment Department in November/December. At these meetings, timing and amount of work and equipment as well as other problems are negotiated. Land preparation usually begins very early in the new year to ensure that it is completed in time for the start of the principal growing season.

Early in the life of BSIP, delays in meeting scheduled programs of land preparation plagued SAED, as did the timely provision of agricultural inputs. The latter was largely because of the Government's delay in making available to SAED the necessary funds to purchase inputs. These problems have been largely mitigated, but still occur occasionally. In 1984, fertilizer deliveries were late, reportedly because of poor scheduling by suppliers. In 1985, heavy equipment was 2 weeks late getting to Bakel, and shortly after arrival, two of the three pieces of equipment broke down. Part of scheduling work includes building slack into the system--whether by pre-positioning sufficient supplies, by shifting supplies from one regional division to another, or by substituting some manual labor for machinery.

### 2.1.3 Meeting Objectives

In any organization in which difficult objectives are set and in which operation inefficiencies exist, informal methods are developed for getting the job done. Certain project personnel, who have kept project and overall organization goals uppermost in their minds and are cognizant of the various bottlenecks that can impede reaching these goals, have taken appropriate actions outside of formal organizational channels. This is not cause for concern; rather, it is part of the "lubricant" that helps an organization function more smoothly. For example, a recent project director recognized that motor pumps were essential to meeting SAED objectives successfully. When financing became available through a donor organization, he obtained eight pumps for Bakel and stockpiled them there for the 1984-1985 season.

On the other hand, adherence to inappropriate objectives continues, such as the planned opening of 340 hectares in BSIP in 1984-1985. Given the late arrival of insufficient heavy equipment in poor repair and the average number of hectares (10-14) that can be prepared for irrigation in 1 week, it is highly unlikely that BSIP will be able to meet the objective by May 31, when land preparation must be completed. There does not appear to be an effective mechanism to alter objectives in the face of immutable constraints. Rather, one knows that some exogenous factor will prevent the achievement of objectives, and one can always blame the exogenous factor. For example, in 1984-1985 the Equipment Division did not send adequate and operable equipment to open the targeted land. Further, USAID only provided funds for 150 hectares.

To conclude, management style, insofar as delegation of responsibility and authority are concerned, is improving. Because BSIP has had a fair measure of success, an esprit de corps exists among the project employees.

### 3. FINANCIAL MANAGEMENT

SAED's accounting, budgeting, and financial analysis capabilities are starting to evolve and grow with the changes in SAED's organizational structure and role. A description of this evolution and the tangential impact that USAID has had follows.

#### 3.1 SAED's General Accounting System

Accounting at SAED is currently done manually but in a format that lends itself to computer processing. SAED employs a Dakar-based firm, Senegal Informatique (SENI), for this purpose. SAED planned to computerize its accounting operations but because of financial pressures had to forego computerization. Recently, several donors have funded the purchase of several microcomputers for SAED.

#### 3.2 Budgeting

Because SAED's fiscal year is July 1-June 30, the formal budget exercise runs from April 1st to June 30th. The exercise starts in the field (e.g., BSIP) and ends in SAED headquarters. The budget is decentralized by cost center and by objective.

BSIP works on its budget until the end of May, at which time it meets with the Financial Department (SAED/St. Louis) personnel in Matam for negotiations and guidance. Once completed in Matam, the budget goes to SAED headquarters for final review by all department directors and approval by SAED's President.

The principal weakness in SAED financial management is the lack of a managerial accounting system, the expertise to do much budgetary and financial analysis, and the ability (because of the lack of management accounting) to exercise the necessary degree of budgetary control. Management accounting is vital for the effective operation of any organization. It allows the organization to analyze its operations, its progress toward objectives, the deviations from budget (variance analysis), and the implications of budgetary, financial, and nonfinancial changes that do or will impinge on the organization. Managerial accounting is distinct from financial accounting, which records only the financial activities of an organization, and at the end of a fixed time period (e.g., fiscal year, calendar year), reports the financial status and financial results of operations (via a balance sheet and a profit and loss statement, respectively).

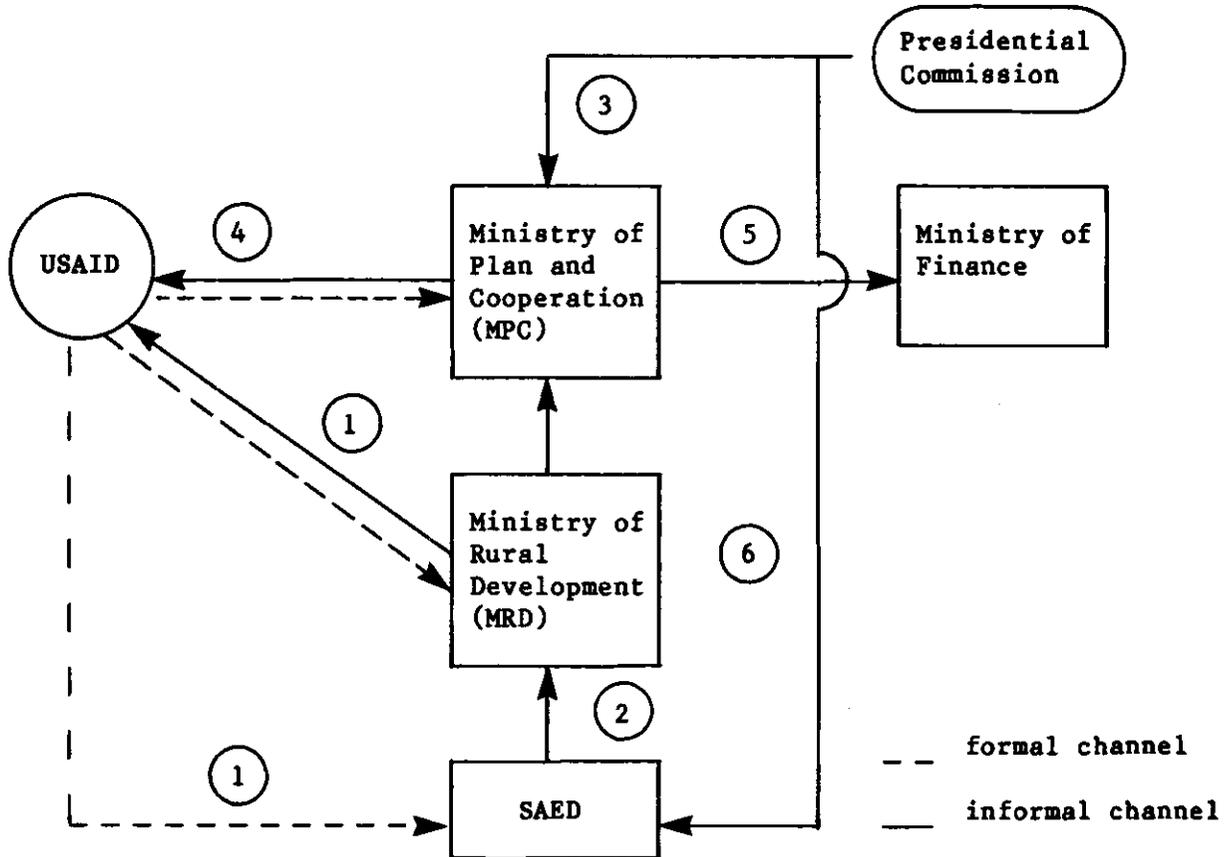
This lack of operative management accounting has recently been partly corrected. Fiduciaire Paris Expertise Comptable (FIPEC), a French accounting and management consulting firm, developed a management accounting system for SAED. According to SAED, the system should be operational in April/May 1985. However, the necessary expertise to maximize the use and value of the system will take longer to develop. Examination of the FIPEC-designed system shows that it lends itself to electronic data processing. Management accounting is vital for a decentralized organization with multiple activities such as SAED.

#### 4. SAED, USAID, AND KEY MINISTRIES

This section examines the formal relationships among SAED, USAID, and three key ministries. Also examined is the interaction that has occurred between SAED and USAID on various levels, from policy to operational. Figure D-3 shows the formal flow from proposed project to project/budget approval. Figure D-4 shows linkages and relationships once budgets and projects are operative. Figure D-5 shows SAED/USAID linkages.

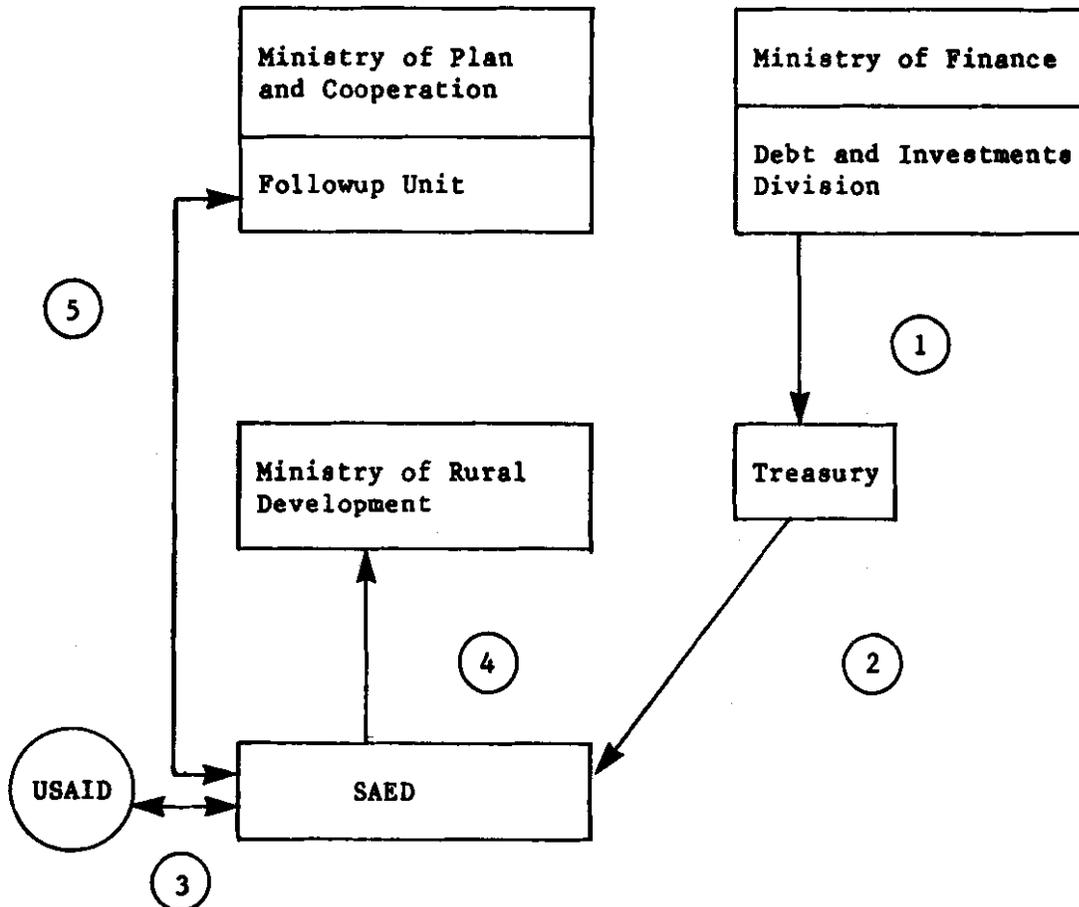
The USAID agricultural development officer and the USAID project manager deal with SAED senior management on policy matters and serious implementation bottlenecks. The USAID project manager and the BSIP project director work closely on day-to-day concerns. The USAID-funded technicians report both

Figure D-3. Flow of Proposed Projects to Approval



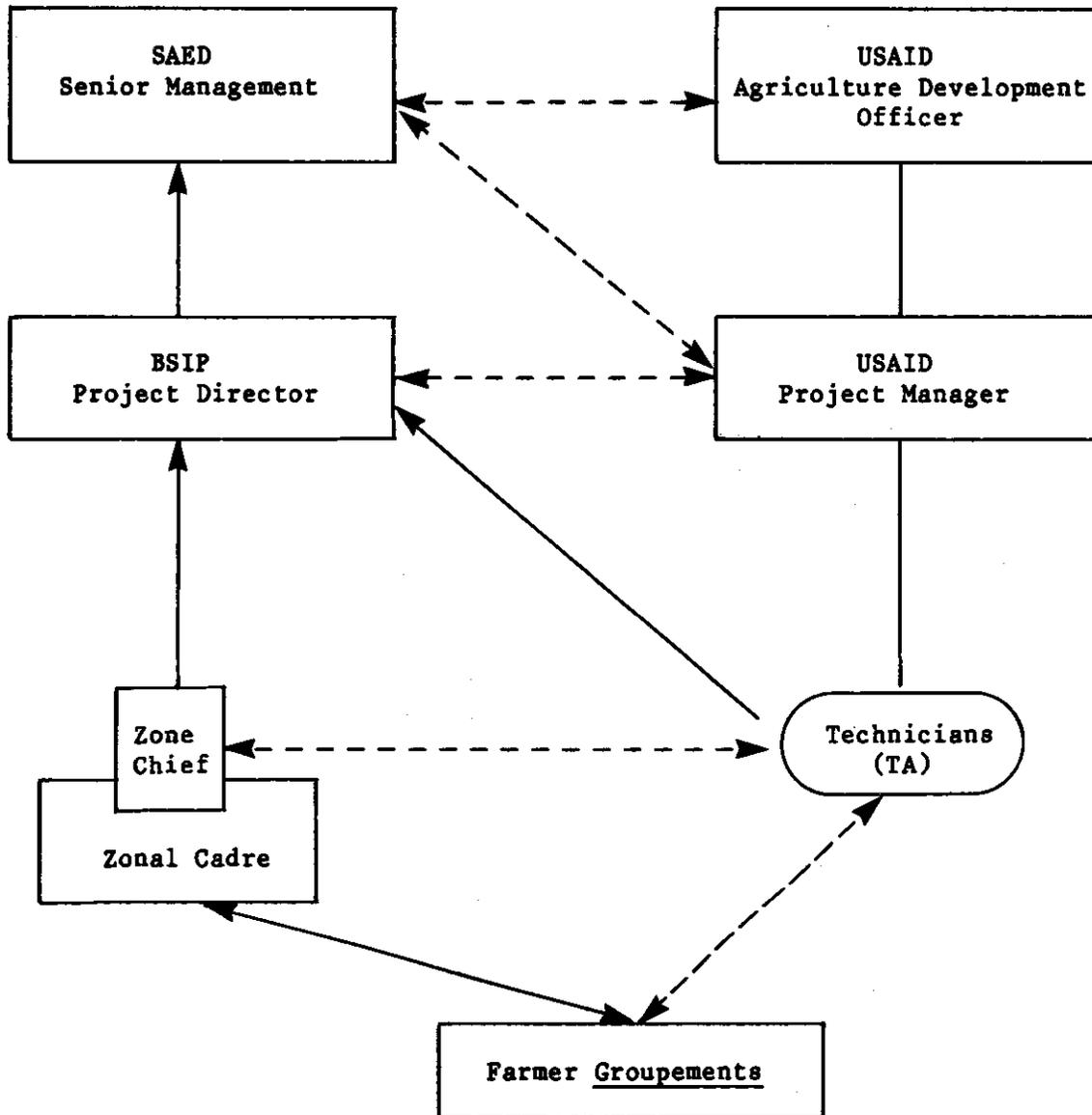
- ① USAID initially can work in two channels: (a) formally with the Ministry of Rural Development, with either party proposing projects, or (b) informally, approaching SAED with a proposed project while at the same time keeping the Ministry of Rural Development informed (SAED operates under the aegis of MRD, except for budgetary matters, in which SAED is autonomous), and communicating officially to the Ministry of Plan and Cooperation that USAID can finance the proposed project(s).
- ② SAED sends its proposed projects to MRD for review and approval.
- ③ MRD compiles approved SAED, MRD, and other parastatals' projects into an overall annual investment budget. This budget is sent to MPC for review and compliance with overall Government budget and plan.
- ④ MPC seeks out and coordinates donors. All donors must get MPC approval for projects.
- ⑤ Once the MRD (and SAED) investment budget is approved and donors are on board, the budget is sent to the Ministry of Finance for control and disbursement.
- ⑥ The Presidential Commission exercises oversight on SAED. SAED's succeeding years' budgets are contingent upon current years' performance toward attaining stated objectives.

Figure D-4. Flow Once Investment Budget and Projects Are Operational



- ① Debt and Investments Division of the Ministry of Finance gives final clearance on investment and operating budgets; instructs Treasury to make Government contribution to SAED.
- ② Treasury transfers Government contribution to SAED.
- ③ USAID channels funds and commodities throughout its fiscal year to SAED.
- ④ SAED keeps Ministry of Rural Development informed and clears any operations with other ministries with the Ministry of Rural Development.
- ⑤ The followup unit of the Ministry of Plan and Cooperation monitors SAED operations and progress.

Figure D-5. SAED/USAID Interaction



— authority/who reports to whom  
- - - levels of interaction and cooperation

to the BSIP project manager (because they are integrated into the BSIP project workforce) and to the USAID project director. They interact with zonal-level personnel and directly with groupements and farmers.

The foregoing depicts the formal structure of the SAED-USAID relationship. The actual relationship between the two organizations can be described as loose, in both a technical and a management sense. On the technical side, the looseness was in the concept of the technical irrigation package. The package was neither highly sophisticated nor highly controlled. Rather, it was a mixture of rice varieties, fertilizer mixes, pumps, and technical assistance to be tried by the farmer. On the management side, the looseness was in a semidetached USAID attitude toward SAED and a lack of close contact and good communications between the two organizations. Opinions of and comments made by SAED senior management point up this looseness:

- "USAID has had little, if any, positive management impact on SAED."
- "There is a lack of continuity and consistency at USAID as reflected in frequent personnel changes and concomitant changes in management styles."
- "With other donors, the fundamentals don't change; with USAID, they do."
- "In retrospect, we wish that USAID had laid out 'the rules of the road' in the beginning, so that we could learn them and adapt to them. What we have found and face today are sudden shifts in requirements (e.g., as exemplified by the recent USAID decertification of BSIP) which only cause confusion and a certain degree of annoyance at SAED."
- "We need [from USAID] a fixed accounting/reporting procedure, even if it is not like SAED's (one which takes into account local situations)--SAED could adapt."
- "USAID sends people out to the field who can not make timely decisions on small matters. Everything must be referred back to Dakar."

Various aspects of the project emphasize the loose management style between USAID and SAED for the BSIP project:

- Lack of standardization of critical commodities, notably pumps and vehicles

- Lack of cost information from USAID to SAED on USAID-procured commodities
- No financial reports received by USAID from SAED from 1979 to mid-1982

## 5. SAED FIVE YEARS FROM NOW

This section describes the various changes that are mandated to take place and the likely effects of the changes on SAED's organizational structure. It concludes with an examination of the role the private sector might play, and the obstacles that must be overcome or circumvented for the private sector to respond to the potential the area offers.

### 5.1 Second Lettre de Mission

Under the mandate of the second Lettre de Mission, the role of SAED is to shift from one of implementation to one of development planning and extension of adapted research over the 1984-1987 period. Whether this is a realistic period of time in which to complete the shift is open to question. Section 5.3, below, explores the possibilities for transferring activities to the private sector.

SAED will progressively disengage itself from certain discrete activities, namely, processing paddy, and to a large extent, from land preparation. These two activities, it is hoped, will be taken over by the private sector. Supply of inputs, including credit, is also to become a function of the private sector. The transfer is to occur in steps, with SAED assisting the groupements (of the small perimeters) under the aegis of the joint management committee in negotiations with suppliers. SAED will most likely continue to furnish credit for those groupements that have just opened lands for irrigation and that, for the near term, cannot assume credit on their own.

Farmers, through their groupements, will assume much greater responsibility for the management of their own affairs (i.e., all agricultural production decisions, finances, negotiating input supply, and marketing of output). The ultimate objective is that each perimeter, large and small, become totally autonomous by 1987. Toward this end, SAED experimented with the transfer of responsibility for water management to three large perimeters in the Dagana division. According to SAED management, the transfer is proceeding successfully. On the other hand, SAED admits that because of the greater level of SAED involvement in

the larger perimeters, total disengagement from the larger ones will be more difficult than from the smaller ones, such as BSIP. As the disengagement occurs, SAED's organizational size will shrink.

## 5.2 SAED's Future Organizational Structure

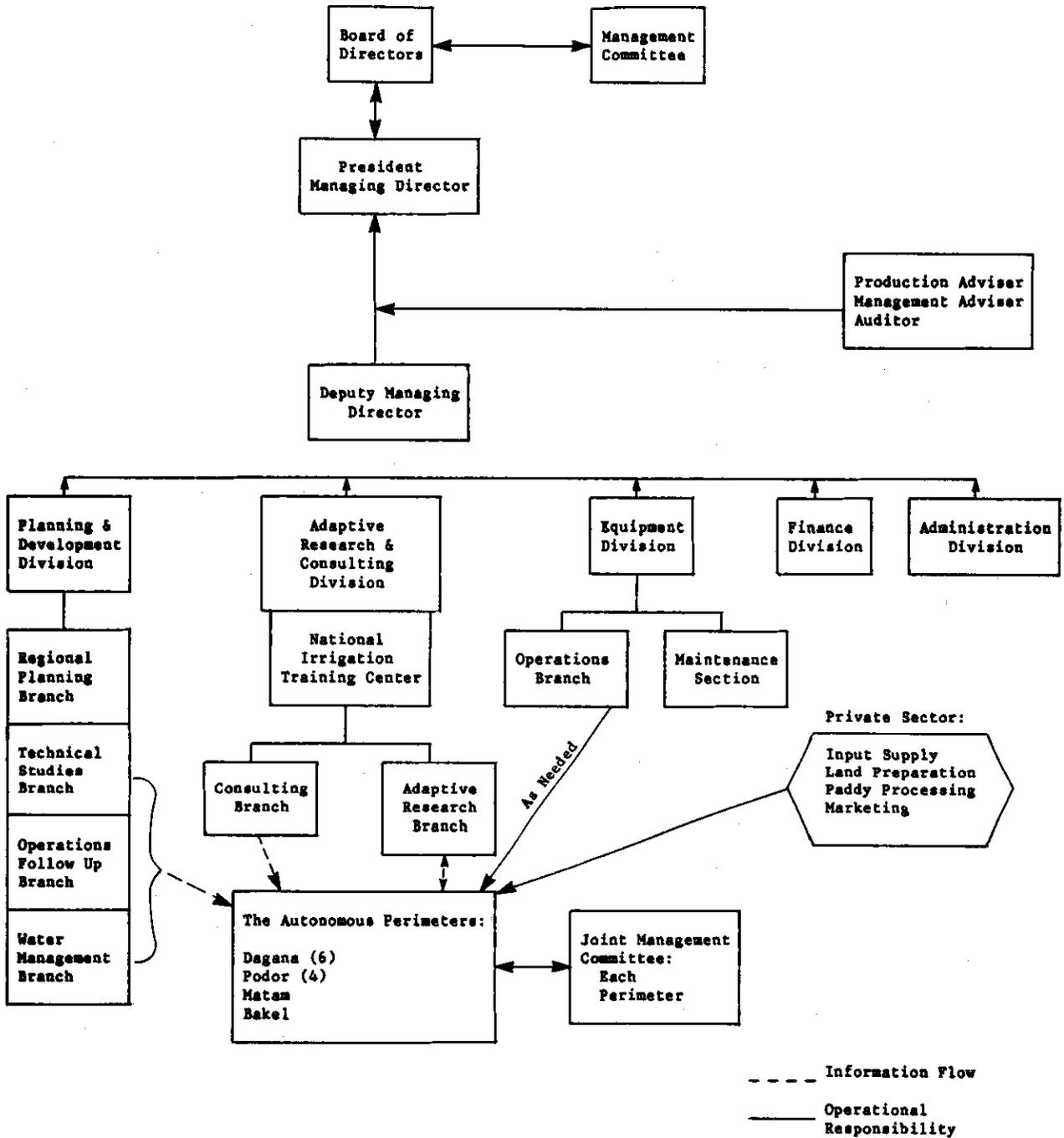
Figure D-6 is an organization chart depicting SAED 3-5 years from now. SAED will be a much smaller and different organization than it is now, provided it is able to adhere to the mandate of the second Lettre de Mission. The highlights of the spinoff of activities are as follows:

- All irrigated perimeters will be autonomous.
- The paddy processing facilities at Ross-Bethio and Richard-Toll will be disposed of (sold, it is hoped).
- SAED will no longer be in the business of purchasing, transporting, processing, and marketing paddy.
- The Equipment Department, with its autonomous operating subsidiary, will practically disappear, as its activities are transferred to the private sector. SAED will maintain a very modest amount of equipment for land maintenance and emergencies.
- As the perimeters become autonomous and various activities of SAED are spun off to other organizations, the Administration and Finance Departments will shrink.
- The Planning and Development Department will remain a key department. The Development and Extension Department will increase its adaptive research activities, while shifting away from direct farm-level extension toward agricultural advising at the groupement level.

## 5.3 Transfer of Activities to the Private Sector

A key part of the decentralization of SAED and its disengagement from various activities is the transfer of certain of these activities to the private sector. How the transfer will occur is not clear for certain inputs, such as fertilizer and credit. It is also not clear how the groupements will be able to finance replacement motor-pumps, because they have not yet established amortization funds.

Figure D-6. Projected Organization Chart for SAED in Three to Five Years (1987-1989)



### 5.3.1 Diesel Oil

The first activity likely to be transferred to the private sector is diesel oil supply. One of the first responsibilities of the BSIP joint management committee, when fully operative, will be to ascertain groupement demand for diesel oil, so that it can negotiate (with SAED as a participant in the negotiations) with oil companies for supplies. As the committee gains experience in negotiation, SAED's role would diminish to that of an observer. SAED would assume a similar role for perimeter purchases of floating tanks (which hold the motor-pumps), which can be built in Bakel. The problem foreseen is whether oil companies and tank manufacturers will give credit. If experience with fertilizer is an indication, they will not--at least not until various groupements have payment records good enough to convince a supplier that they are a good credit risk.

### 5.3.2 Fertilizer

Fertilizer poses a problem in that suppliers are unwilling to give SAED even 30-day credit on fertilizer purchases. It is very unlikely, therefore, that they would give groupements credit. In addition, suppliers are located in Dakar. SAED, in an attempt to interest suppliers, has let it be known that they will do business only with those suppliers offering credit and willing to establish supply facilities in the Senegal River region. An additional short-term problem exists, in that as the subsidy on fertilizer is lowered, farmer demand drops--a disincentive for suppliers. However, as the subsidy on the price of finished rice is decreased and the price allowed to rise, rice production, and therefore demand for fertilizer, should rise.

### 5.3.3 Spare Parts

The situation is somewhat different for motor-pump spare parts. Demand appears to be sufficient to interest the private sector. Private companies, however, pay an import duty of 98 percent on spare parts, whereas SAED pays no duty. Transfer to the private sector of spare parts supply, under current laws and regulations, would result in a doubling of the price of spare parts, with a consequent decrease in demand. The drop in demand might be sufficient to discourage private companies altogether.

### 5.3.4 Credit

Regarding credit, SAED takes the reasonable position that it will probably have to stay in the credit business for a while. It estimates that currently no more than one-third of all the villages practicing irrigated agriculture along the Senegal River could handle credit on commercial terms. Of the remaining two-thirds that would need some sort of subsidized credit, about one-third of these would need interest-free loans (for inputs) as their new lands are opened, and SAED would probably face, and have to absorb, low repayment rates. SAED estimates that a village requires approximately 50 hectares of irrigated land under production before it can start repaying its loans consistently.

The longer term question for BSIP is who will provide credit? The large, better established irrigated perimeters are more attractive to commercial banks. In fact, there is no bank in Bakel. For the shorter term, the options appear to be as follows:

- SAED continues in the role of credit provider.
- An agricultural credit bank (e.g., the Senegalese National Agricultural Credit Bank--CNCAS) assumes the responsibility from SAED.
- A new local bank is established to handle those few villages that can pay commercial terms, and SAED or CNCAS handles those villages of weaker financial standing.

### 5.3.5 Marketing

As far as BSIP is concerned, the shift of the marketing function is virtually a moot question. The marketing function is split into two activities: (1) the purchase by SAED of surplus paddy from groupements and (2) the sale (after processing in its mills) of finished rice to the Price Equalization and Stabilization Office (CPSP). In the Bakel perimeter, what surplus paddy exists is already sold privately or, in the case of three villages, processed into finished rice using small village rice mills. Discussion with a local Lebanese merchant disclosed that local demand for rice could not begin to be met by BSIP growers. Observation in the city of Bakel tended to support this assertion, because all the rice being transported around the city was imported.

Based on data obtained from an AID-financed technician, small village rice mills appear to present an opportunity for the farmer to earn between CFAF 2,000-4,000 more per 100 kilograms (kg) of paddy than by selling paddy directly to SAED at official prices or to small merchants at lower prices. Based on the same data, mills also give the owners (groupements) the opportunity to earn more than CFAF 3,000 per 100 kg of paddy. At current prices of paddy and finished rice, CFAF 66/kg and CFAF 160/kg, respectively, the village mill becomes even more attractive, offering a net return per 100 kg of paddy processed of approximately CFAF 4,700.

SAED reports that there are 18 village rice mills currently operating in the Lampsar Savoigne perimeter of the Dagana division. Village rice mills today offer a modest opportunity for the BSIP, given its relatively small total production of paddy. Five mills, appropriately positioned in the Bakel region, would probably suffice. Assuming less than optimal mill operations, the number of mills required might increase to six or seven.

## 6. FINDINGS

This appendix concludes with a series of findings based on examination of SAED's and USAID's relationship over the life of BSIP. The findings all fall under the general rubric of management.

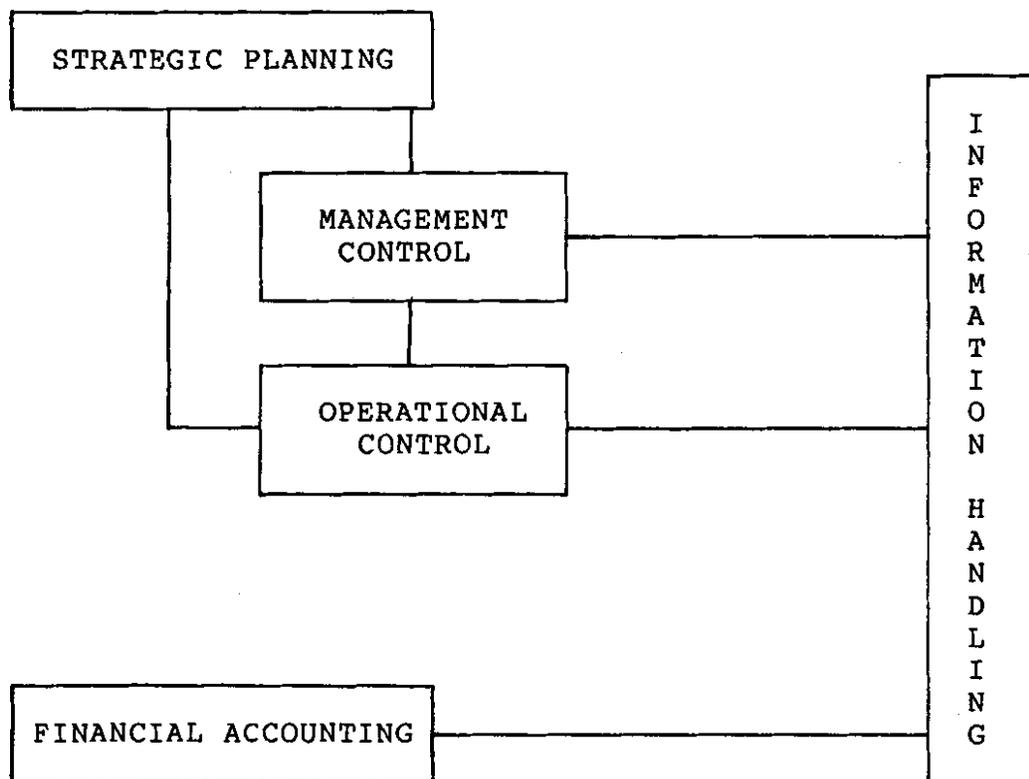
### 6.1 Management and Communications

USAID's impact, via BSIP, on SAED's management has been recent, of a mixed nature, and, from SAED's viewpoint, marginal. In retrospect, USAID could (and should) have had a management (including financial) component in the project design of BSIP. Management is at once a skill, an art, and a science at which the United States excels. An overview of BSIP from its inception shows that many of its early problems could have been avoided, or minimized, had there been a management component (including planning, co-programming, sequencing, and monitoring/evaluating functions) from the outset.

Had USAID personnel been closely involved with SAED initially in the programming of project activities, USAID would have had more influence on and better control over project progress, would have had better communications and rapport with SAED, and both organizations would have learned how to work effectively together. The root of many of the complaints voiced by SAED vis-a-vis its working relationship with USAID is simply the lack of a continuing USAID involvement with SAED management.

An important tool in a management component would have been a formal management planning and control system (MPCS) comprised of five elements, as depicted in Figure D-7.

Figure D-7. Sample Management Planning and Control System



SAED has these five elements. It is simply a matter of designing an effective MPCS based on the five elements. Some advantages to SAED of a formal management planning and control system are as follow:

- One of the principal problems facing SAED is its choice of inappropriate objectives (e.g., maximum number of hectares opened). A well-designed MPCS would have a variety of progress indicators (yield, income per hectare, and the like) built into it and would generate a range of data on progress (or lack thereof) that could help convince management to change its objectives or have more than one set of objectives.
- An MPCS would be a valuable tool given SAED's changing environment as it becomes less of an implementing agency and more of a planning/research organization.

Strategic planning will change as SAED decentralizes and tries to disengage from various activities. The future provision of credit to farmers, for example, will require careful strategic planning (see Appendix E for a more detailed treatment).

- An MPCS would address SAED's expressed problem that many middle and lower level management employees do not really understand how their work fits into and contributes to SAED. Knowing how one's work contributes is a basic element in employee motivation.
- An MPCS provides management at all levels with an "early warning system," that is, the means by which to identify problems before they actually occur.
- An important element of an MPCS is the monitoring of the environment in which an organization operates. Such monitoring could have provided SAED with advance notice early in 1984 that its fertilizer supplier was running behind schedule, thus permitting SAED to take remedial action (e.g., lining up alternative sources of supply). An MPCS would provide SAED the means to simulate the impact of delays in input supplies and therefore to blunt the effects of delays by building slack into the input supply system. This slack could take the form of acquiring alternative supply sources, carrying safety stocks, and pre-positioning inputs at key locations.
- SAED's decentralization and consequent delegation of responsibility have not been accompanied by an equal delegation of authority. The visibility that an MPCS provides would help speed the delegation of authority.

## 6.2 Financial Management

The second aspect of the management findings is in the financial area. Last year's decertification of the BSIP project is used to emphasize deficiencies in the SAED/USAID working relationship and to define future opportunities that the two organizations could exploit.

### 6.2.1 Decertification

The recent decertification of BSIP in October 1984 happened because SAED's accounting system and the subsequent reports did not meet AID's requirements concerning accountability for AID

funds. The decertification raised several interesting issues and has underscored the need for both parties to understand each others' accounting systems, requirements, and how the two may be linked to satisfy AID's requirements with the minimum of strain on SAED's already overburdened staff.

Regarding the decertification itself, the General Accounting Plan of Senegal, which SAED follows, does not mesh directly with AID reporting requirements. Second, the Deloitte, Haskins, and Sells 1984 audit revealed that SAED has a sound accounting system, with good procedures and adequate control. The weakness of the system lies in its implementation, and this is what led to the decertification. The poor implementation is largely due to a lack of well-trained accounting personnel at SAED headquarters. Also, SAED has reporting requirements not only for USAID, but also for all its other donors. Because of the sheer lack of personnel, SAED states that it does not maintain specialized accounting systems for any of its donors.

#### 6.2.2 Reporting to USAID

The implementation problem is highlighted by the fact that no SAED financial reports were received by USAID from 1979 to mid-1982.<sup>3</sup> On the other hand, there is little evidence that USAID put pressure on SAED to report during this period.

#### 6.2.3 Training

In an effort to reduce the reporting problem, the Senegal Financial Management Team of the AID-financed Sahel Regional Financial Management Project (SRFMP) has held training sessions for SAED accounting staff. These sessions covered the use of new basic accounting journals and procedures so that SAED accounting staff could comply with AID reporting requirements.

A management accounting system has been devised for SAED. Deloitte, Haskins, and Sells reports that SAED's financial accounting system is sound and has good procedures and adequate control. SAED had planned to computerize its accounting operations 2 years ago but encountered a severe case of capital rationing, which forced it to make the choice between diesel fuel for irrigation or computers. Diesel fuel prevailed. Recently, SAED is reported to have received or is soon to receive several microcomputers from various donors.

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<sup>3</sup>According to a Memorandum of Imelda Garza, USAID Controller's Office, Dakar, May 13, 1982.

The new management accounting system (not yet on-stream) coupled with the microcomputers presents an opportunity for USAID to assist in improving SAED's financial and overall management. The management accounting system and the microcomputers are the key elements of a management information system. If well-designed, such a system would provide the following:

- Use of the project budget as an effective tool for management control of project expenditures and as a planning aid
- Timely and accurate financial analysis, including budget variances (actual expenditure by line item to date versus planned expenditure) and analysis of unspent funds by line item for interim planning
- Rapid retrieval of information, including basic accounting documents, and accountability for all budget line items (who, what, when type questions can be answered quickly and precisely)
- Timely, adequate financial reporting that will fulfill USAID reporting requirements and assist USAID in the monitoring of project implementation
- Sensitivity analysis ("what-if" studies) would be possible through hypothesizing internally or externally caused changes in project activity/expense category/line item to see the effect on other areas budget and on the budget as a whole. Sensitivity analysis coupled with analysis of unspent amounts would give SAED management the ability to know where optimally to channel resources, considering the constraints that exist.

In summary, had USAID chosen to work closely with SAED on the managerial side, it is likely that the project would have been even more successful than it is today. More important, perhaps, the disengagement of SAED from various activities and the concomitant transfer of the activities to the private sector could have been eased. A better managed project with rational objectives would have meant a farm population better able to pay for inputs and to qualify for credit from suppliers. A farm population of the size encompassed by the BSIP system and able to pay for inputs is one that would attract private sector sources of supply.

## APPENDIX E

### FINANCIAL MANAGEMENT

#### 1. COMMODITY FLOWS

##### 1.1 Procurement and Systems

There are three methods by which commodities are procured for the Bakel Small Irrigated Perimeters (BSIP) project:

- USAID Procurements: USAID purchases those commodities that must be bought in the United States because of technical specifications or AID regulations (e.g., the purchase of U.S.-manufactured vehicles) or that are considered high-cost items. Specifications on commodities are determined jointly by USAID and the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED). USAID delivers the commodities to SAED once they arrive in Senegal.
- SAED Procurement: SAED handles procurement for local goods, including the procurement of some international goods through local dealer representatives. SAED puts out a tender for bids and chooses a supplier with the consent of USAID. On receipt of the merchandise in acceptable condition and the supplier's invoice, SAED then asks USAID to pay the supplier.
- BSIP Procurement: An imprest fund was opened at BSIP headquarters to facilitate the purchase of low-cost items locally. BSIP purchases items, justifies the purchases to USAID, and AID replenishes the imprest fund monthly to a level not to exceed CFAF 1.5 million.

SAED sees certain advantages and disadvantages to the three-tiered procurement system. Regarding USAID procurement of items, the principal advantage is that SAED does not have to become involved, except on technical feedback for the actual costs of items procured by USAID. Lack of historical cost information, of course, hampers both financial (impossible to have a depreciation account) and managerial accounting. Budgetary and financial analyses are made that much more difficult.

SAED sees no real problems with its own procurement and the need for USAID's approval on choice of suppliers. All donors require this. BSIP procurement through the imprest fund (the

"local account") led to accounting reconciliation problems between SAED and USAID, resulting in a late-1984 decertification of BSIP. The conflict arose out of USAID requests for accounting information and reports in a form that SAED's accounting system (which follows Senegal's General Accounting Plan) was not able to generate. Also, SAED felt that they did not have enough qualified personnel to set up and operate a special accounting system for USAID.

## 1.2 Standardization of Commodities for Area-Specific Needs

Looking at procurement from the BSIP level, some of the logistic problems of the early years could have been mitigated by more rigorous efforts at standardizing critical commodities. In the early years of the project, Bakel was physically isolated via road, and transportation was difficult and expensive. Because of the procurement policies of SAED and AID, vehicles of different makes, heavy equipment, and pumps required a complex and expensive--and often inadequate--spare parts and repair network. The design team foresaw this need and obtained an initial waiver for specific vehicles. These original purchases depreciated, however, and records abound on the project officer in Dakar having to spend an inordinate amount of time processing additional waivers. At the time of the team's visit to Dakar, although Bakel had theoretically settled on one type of pump, 10 nonstandard and inappropriate pumps financed by AID and 8 nonstandard pumps financed by SAED were in stock, each with an inadequate supply of spare parts and the AID-financed ones with no dealer in Dakar as backup. The vehicle fleet included two new AID-funded Mitsubishi's, a number of older AID-funded Chevrolets, at least one AID-funded AMC Jeep, and a rather complex but well-organized stock of spare parts that might serve the needs of all of the above. Although the BSIP warehouse had excellent records by make and model, a well-organized inventory control system, and the project mechanics are reportedly quite competent, it is strongly suggested that in future projects located in remote areas without easy access to dealers and parts suppliers, more rigorous attention be given to standardizing vehicles and equipment.

## 2. INPUTS TO FARMERS

The parallel AID-financed SAED Training Project was successful in establishing good input distribution systems and inventory management control systems at the perimeter level. Fertilizer and seed pass directly from supplier to zonal warehouses. Fertilizer is shipped in supplier trucks to its destination and billed to SAED on a cost plus freight basis.

The Training Project trained warehouse men in inventory management and control. Retraining today is handled by SAED. USAID reequipped workshop and maintenance shops at the perimeter level for all of SAED, and workshop/maintenance personnel received training. The high quality of training inventory system management was evident to the team at the BSIP headquarters. Both the warehouse and the workshop are professionally run.

Annual resupply of pump, motor, and vehicle spare parts is made from Dakar. Based on experience, the warehouse manager generally is able to maintain an optimum supply of spare parts. The chief mechanic and the zonal mechanics have the common spare parts with them when they go to the field. Two months prior to the start of irrigation, the mechanics make a complete tour of villages to repair pumps. Villagers report no delays in getting spare parts from Bakel.

Before the start of each crop season (rainy season and cool-cropping season), demand estimates for projects are obtained from the groupements by the zonal credit agents. From the compilation of the three BSIP zones, less inventories on hand, BSIP transmits the total estimated demand for the perimeter to SAED/St. Louis. The normal sequence of events is that SAED/St. Louis lets contracts through a bidding procedure with suppliers. Fertilizer, for example, is delivered directly to the zonal warehouses from which groupements pick up their supplies for village storage either in traditional or SAED-built warehouses.

To ensure that groupements have sufficient supplies of diesel oil, storage tanks have been placed in villages that are difficult to reach during the rainy season.

What is clear from both the success of the SAED Training Project's effort in establishing effective distribution, inventory, and maintenance systems and BSIP's improvements in its overall distribution system is that input distribution does not have to be erratic and inadequate. Planning the system and its needs, coupled with managerial assistance to SAED early on, could have obviated many of the problems that arose in the early 1980s. The planning done and managerial assistance given by the Training Project is evidenced today at BSIP headquarters warehousing and shop facilities. In the field, these two factors have proven to be essential in effectively managing inputs and testing farmer demand for inputs and services on a timely basis.

3. CREDIT

The key issue for the future of BSIP, as SAED progressively disengages from being an implementing agency, is that of financial sustainability. Financial sustainability raises the question of credit and SAED's role as banker to small irrigated perimeters.

Will SAED, or another organization, such as the Senegalese National Agricultural Credit Bank (CNCAS), adopt a developmental philosophy or a commercial bank philosophy toward credit? Is the Government of Senegal, from CNCAS to SAED, willing and able to accept low repayment costs over the longer term to spread the concept of credit? Or will the Government take a harder, commercial bank approach to credit, thereby limiting itself to clients who can fully repay? If the developmental philosophy is chosen, how great is the financial staying power of SAED or CNCAS? How much time can either afford to give the farmers?

These questions directly affect the future of BSIP. The BSIP overall credit situation (current and past farmer indebtedness) must be described as bleak. The latest, complete data, the 1983-1984 Repayment Situation dated January 31, 1985, shows the following:<sup>1</sup>

- Of 28 small irrigated perimeters:
  - 4 villages are up-to-date on both current (1983-1984) and past debts
  - 4 villages are up-to-date on current (1983-1984) debts
  - 6 villages are up-to-date on current (1983-1984) rainy season debt

-- Total debt outstanding as of January 31, 1985:

	<u>CFAF</u>	<u>Percentage</u>
- Rainy Season	4,831,759	14.4
- Cool-Cropping Season	4,739,018	14.1

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<sup>1</sup>"Situation des Remboursements de Dettes, hivernage, contre-saison 1984-1984." BSIP Credit Manager, January 31, 1985.

	<u>CFAF</u>	<u>Percentage</u>
- Past Debt (1982-1983 and earlier)	<u>24,071,734</u>	<u>71.5</u>
- Total	33,642,511	100.0
-- Percent of debt repaid as of January 31, 1985:		
		<u>Percentage</u>
- Rainy Season		76.8
- Cool-Cropping Season		39.7
- Past Debts		<u>3.6</u>
- Average		37.1

The only bright spot in this picture is that BSIP is working with the groupements to first get them up-to-date on current debts and then to start paying off the past indebtedness.<sup>2</sup> Although old records were not available to the team at BSIP, some of the past indebtedness reportedly dates from 7 or 8 years ago.

The origin of the present problem was probably the Senegalese Government philosophy of giving commodities and services to farmers, partly on the grounds that they were too poor to pay and partly to move them into more modern, productive agriculture. This problem is perhaps best exemplified by the outright giving of pumps to groupements, followed by a more recent requirement that small irrigated perimeters establish amortization funds so that the perimeters will be able to replace (pay for) new pumps when the old ones wear out.

Although farmers support the idea of amortization funds, they still believe that SAED will give them the replacement pumps. To date, not one perimeter has established and maintained an amortization fund. One perimeter, Collenga, reportedly established an amortization fund but had to use it to pay for spare parts for a pump motor that was defective.

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<sup>2</sup>It should be noted that foreign remittances, a large portion of the total income of the area, must be considered part of the total resources available to service debts. One village visited had sufficient money to build its own dispensary but does not have enough money to repay its debts to BSIP. This indicates the farmers' perception of SAED as a giver of resources.

BSIP has adopted the following general criteria vis-a-vis increasing credit payment:

- The perimeter unable to repay because of crop failure is forgiven the debt for the failed season.
- If poor management of the perimeter results in a lower repayment rate, BSIP will work with the perimeter villagers to improve their operations and increase their repayment rate.
- Outright refusal or continued poor management will result in the perimeter being closed.

There are many variations in the application of the criteria. On paper, SAED requires 100-percent repayment; however, 80-85 percent repayment is considered acceptable. If a perimeter shows good faith (i.e., is making a serious effort to repay), it will get inputs on credit. If the perimeter is only making an average effort, it may receive its first delivery of diesel oil on short-term credit (i.e., the first delivery must be paid for before a second delivery can be made).

Given the time constraints imposed by the second Lettre de Mission and the recent financial constraints faced by SAED, what strategy should SAED adopt? First, it will most likely have to absorb those BSIP debts that are over 2 years old. Second, SAED and the Government will have to decide how quickly SAED should get out of the credit business. Third, the Government will have to decide which credit approach to take (i.e., developmental or commercial banker approach) and for how long. The overriding question appears to be how long can the Government and the donor community afford to subsidize farm credit?

#### 4. ACCOUNTING AT THE GROUPEMENT AND FARM LEVELS

##### 4.1 Record Keeping

At the groupement and farm levels, financial records range from rudimentary to mediocre. Many maintain no written records other than those that SAED provides. In effect, SAED provides an accounting/reconciliation service for the groupements via color-coded forms used for input deliveries on credit. These are reconciled with the groupements at the end of each growing season. The groupement has its own copies, receives a copy of the delivery documents, and receives receipts when it makes repayments. Accounting control is adequate, and the system functions reliably.

SAED admits that groupement-level accounting, as a part of groupement management, needs much attention. At the SAED level (i.e., as zonal credit agent to SAED/St. Louis), basic records are well kept and regular reporting is done, albeit sometimes tardily.

As the SAED disengagement proceeds and more responsibility for day-to-day operations is turned over to the groupements, the need for managerial (including accounting and record keeping) skills will grow. One obstacle that SAED will have to overcome is the illiteracy of many village irrigated perimeter treasurers. They rely on a cashier (an elected position in some groupements) who is literate or on a literate villager who can at least record individual farm debt repayments. An indication of the task ahead is the work now being started by zonal credit agents in "document classification." Training in document classification (i.e., delivery receipts and the overall groupement debt repayment record) entails, at this point, teaching treasurers to keep these records separate from their personal records.

#### 4.2 Farm Records

The only formal farm records are generated from the Senegalese Institute for Agricultural Research (ISRA) field sampling to determine yields. A 100-square meter plot is harvested and the production of that plot is extrapolated over the entire perimeter for a given crop. Unfortunately, nonproducing parts of the perimeter (e.g., dikes, canals) are included in the area extrapolations. As far as the team could determine, farm production records on the groupement side exist in the heads of one or more groupement officials and, in many instances, are expressed monetarily--"We sold CFAF worth of corn last year." Farm and overall production records will become increasingly important as the perimeters move toward autonomy.

## APPENDIX F

### TRAINING AND STAFF DEVELOPMENT

#### 1. SUMMARY

Training in the National Society for the Management and Exploitation of the Senegal and Faleme River Basins (SAED) as it relates to the Bakel Small Irrigated Perimeters (BSIP) project corresponds to the three-tiered structure of the project. The training of rural-level SAED staff occurs at the main SAED training centers. This staff in turn, as part of their field duties and along with U.S. technicians, train selected villagers for specialized village positions at the project headquarters in Bakel. The same staff, U.S. technicians, and extension agents train farmers at the village level. Thus, there is a cascading effect of training from SAED training centers, to the project base, to the villages.

As part of the training and staff development in the project, the following observations can be made:

- Training, as the project progresses, has been increasingly effective, emphasizing hands-on training and, for the SAED staff, theory integrated with practice.
- Training for the key field manager, the zone chief, as part of SAED's recent policy of decentralization, has included management along with technical aspects.
- Training at the village level is multifaceted, combining various types of extension activities.
- Recruitment and staff development at the village level is uneven and erratic; within SAED it is more standardized and systematic.
- Training has had an impact at all levels, but more so with SAED staff than with village specialists and farmers.
- There appears to have been no systematic attempt to train SAED staff to replace U.S. technicians; rather, the selection of participants for long-term training has been haphazard, and it has been assumed that SAED had sufficient staff to replace them.

## 2. THREE-TIERED SYSTEM OF TRAINING

### 2.1 SAED Training Centers

There are three main SAED training centers: (1) the Senegalese National Training Center for Irrigation (CNAPTI) at N'Diaye, (2) Ross Bethiou, and (3) Richard Toll. The first, CNAPTI, emphasizes general (including management) training; the second, Ross Bethiou, mechanics; and the third, Richard Toll, mechanics and extension. Recently, CNAPTI also has assumed training of mechanics; thus, discussion will concentrate on its operations at N'Diaye, located 35 kilometers outside of St. Louis. All of the zone-level staff of BSIP project were trained at CNAPTI or Ross Bethiou (as mechanics), and some of the staff at the Bakel center were also trained at CNAPTI.

As far back as 1978, in the original training curriculum at CNAPTI, it was noted that "there is still no effective management of the perimeters. For the future, key SAED personnel responsible for this management will be given appropriate management training in addition to their technical training." Despite this caveat, the curriculum and actual training at that time emphasized technical aspects such as soil use and land development, crop production, roads maintenance, workshop organization, and marketing and distributing products, although some attention was paid to communication techniques, procurement, and management techniques. The recent decentralization policy of SAED, however, encourages more general training and orientation of mid-level staff. It now includes the managing of a variety of technical staff; the ability to organize farmer extension literacy and orientation programs; the capacity to carry out and use research and surveys in the creation, extension, and operations of perimeters; and a core body of technical training.

For SAED staff, there are two basic training courses: (1) a continuous 18-month course beginning with classroom instruction at CNAPTI for 6 months, field exercises at an assigned perimeter for 6 months, and followup instruction, practical work, surveys, and evaluation back at CNAPTI for the final 6 months; and (2) a series of 2-week seminars given 18 times for 2 years at the center. Staff who complete the first become Conseillers Agricoles (CA). Those who complete the second are Agents Techniques d' Agriculture, (ATA). Among other field positions, the CA is likely to become zone chief and the ATA to become a credit agent, extension agent, or mechanic. The latter also serves as a retraining source for field staff who may take a few short sessions when appropriate and needed. Approximately 75 graduates from both courses are planned each year. These courses, whether as one continuous course or a

complete series of seminars, have a core content, with the second series having more specific material for the credit agent and mechanic.

The overall objectives of these two courses are the following:

- Provide SAED agents with the knowledge, skills, and sensitivities to cope with the specific problems of the perimeters
- Train them as intermediary-level managers of the perimeters
- Make them aware of the culture, background, and environment of the inhabitants
- Relate research findings to planned and current operations

The curriculum comprises four parts: perimeter description, management techniques, crop production, and rural development awareness.

Both the curriculum guides and methods of instruction keep the transmission of knowledge and skills very specific, concrete, and adapted to the actual setting of the perimeter environment. Each unit is broken down into discrete but interrelated modules. Each module has a specific objective or set of objectives that correspond to the tasks that the zone chief or extension agent will have to perform in the field. Specific sessions in the ATA course are geared to the tasks of the credit officer and mechanic. These sessions focus on procurement, accounting and stock supply, and engine principles, operations, maintenance, and repair, respectively. In effect, the training by objectives consists of providing techniques to the SAED staff who will use them to carry out their responsibilities. Evaluation comprises a series of specific tests at the end of every 2-week session.

## 2.2 Project Headquarters at Bakel

Two types of training are given at Bakel: specific training for the village pump operators and technicians and general orientation for groupement officers. The first is similar to the short sessions given at CNAPTI, only shorter, lasting at most a week. The second type of training is supposed to be given by appropriate SAED staff (e.g., mechanics or pump specialists train village pump operators and the Bakel or zonal extension officers train the village extensionists). In fact, the U.S. technicians did most of the training.

The village extensionist (technician) is an all-purpose extension aide. He is supposed to assist the zone extension agent by demonstrating or helping farmers to use improved cultivation techniques or to repair and maintain canals and dikes. Initial training occurs at the Bakel office or demonstration farm, with followup training at the perimeter. Cultivation techniques focus on field crops and vegetables, emphasizing the use of seed beds, row planting, fertilizer application, insecticide use, water application, and storage. Irrigation instruction and followup focuses on maintaining the required depth and slope of canals, soil leveling, water control, and use of water distribution schedules for the whole perimeter. Instruction is simple; village extensionists are supplied with seeds and fertilizers and encouraged to install small demonstration plots at their villages (eight were in operation at the time of study). Slide and film shows reinforce this training. Followup training for village extensionists appears to be more regular than that for pump operators. About half the villages had trained pump operators and extensionists, and initial training for both occurs biannually.

### 2.3 Village Level

The most frequent type of village-level training involves visits to the perimeters by U.S. technicians and zone extension agents to provide two types of training: farm extension and water management. They may occur at the point of delivering farm inputs, installation of the irrigation system, or during followup visits.

Farm extension is widespread in Bakel, with every village eventually receiving extension. One U.S. technician said he, his assistants, and the zone extension agents visited villages 3-4 times a week. Villages closer to the project and zonal offices receive more attention. As with village extensionists, basic techniques are simply demonstrated in the farmers' fields or in collective or demonstration plots. Special attention is given to rice cultivation and the preparation of seed beds and transplantation to the fields--a relatively sophisticated technique for farmers who traditionally planted sorghum in rainfed areas. During these visits, U.S. technicians and SAED extension agents try to reinforce the role of the village extensionists by using them as contact points and having them assist in the demonstration or instruction activity.

Water management training is also pervasive and is given when a perimeter is created or extended and during followup visits. The U.S. technical engineer, his assistants, zone extension agents, and mechanics are responsible for this.

Villagers are instructed and organized to carry out basic construction, field preparation, and maintenance, or to assist or follow up work done by machine graders, tractors, or diggers. Especially important is understanding and following the water distribution schedule. The U.S. technician and extension agents explain the importance of this to villagers, help them coordinate the activities of each subgroup in its application, and monitor and follow up this activity. In addition, they assist villagers in forming work groups as needed for land clearing, construction, and finishing of secondary canals and small dikes.

SAED has given no literacy training at the village level, and this is an admitted weakness by SAED staff. They recognize the need for literacy, especially for groupement officers, and a general literacy training program is planned for 1985, with possible assistance from the Food and Agriculture Organization (FAO).

### 3. RECRUITMENT AND STAFF DEVELOPMENT

Within SAED, staff appears to be recruited, advanced, and retrained according to fairly standard criteria, particularly upper level staff. For villagers, whether they be pump operators, extensionists, or groupement officers, the criteria are not so clear; for pump operators and extensionists, retraining is erratic, with a relatively high turnover of personnel.

#### 3.1 SAED Staff

Thirty percent of SAED staff are career Government functionaries, who have been recruited by SAED through the Ministry of Rural Development. The pay scale is standardized, their promotion is automatic, and they are relatively secure in the positions while detailed to SAED. The other 70 percent are contract staff with SAED and are recruited directly from the labor market. More senior staff are also recruited from Government, the labor force, or as free agents upon completion of studies.

The crucial factor determining one's rank in SAED is education level. Senior staff usually have some kind of university or advanced technical degree, usually from abroad. Both the current and recent project director have technical agricultural degrees from the U.S.S.R., equivalent somewhere between a B.S. and M.S. degree in the United States. The project accountant has an advanced high school degree

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(Baccalaureat); the zone chiefs have a school leaving certificate (BEPC), 2-3 years of agricultural training at a national institute, and the 18-month Agricultural Adviser course in SAED. Other zone-level staff usually have a school leaving certificate and specialized SAED training. Clearly, the higher the level of education one has, the easier it is to advance.

Other factors, however, affect advancement, such as performance and available opportunities, particularly for SAED contract staff. Four basic criteria are used to measure performance: quality of work, quantity and rapidity of work, responsibility and punctuality, and discipline and interpersonal relations. Standard forms are used by supervisors to evaluate employees each year. As in any bureaucracy, personal relations between supervisors and subordinates, positive and negative, can accelerate or impede advancement. Advancement comes in the form of position and salary. Usually they are commensurate, although not necessarily so. For example, one zone chief has been with SAED for 11 years and has been a chief for 6 years. Even with substantial retraining, he still remains a zone chief. However, his salary has almost doubled. His limited education has set a ceiling on his rank, but in-service training has increased his salary.

Recently, SAED has revised its salary schedule to bring it more in line with Government salaries, and, according to the recent project director, movement within SAED is easier than within Government. He has recently been promoted to head a new section in SAED, and he says he has more opportunities to introduce innovations and new programs than he would if in Government. The current director, however, is a Government functionary, as is his assistant, who recently left SAED for the Government because he feared he would lose his job if he remained there because of general cutbacks in parastatal staff in Senegal.

### 3.2 Villagers

Although pump operators and extensionists all appear to receive substantial initial training, their turnover is high. They often lose interest in their work, leave the village, or become preoccupied with other activities. Often those selected already have some education or training, and in a few cases additional training contributed to their looking for work elsewhere. The selection process did not always uncover the most committed and stable candidates. In addition, payment in salary or services by villages is erratic, if it exists at all. Finally followup training, which should strengthen their commitment, is also erratic.

This is not the case with the groupement officers. Usually they are villagers close to the center of village power (i.e., relatives of the village head), are older, and are committed to village welfare. Not all receive adequate initial training or orientation, but their commitment and participation in the operations of the perimeters are more stable than that of the pump operators and extensionists.

#### 4. EFFECTIVENESS OF TRAINING

It is difficult to measure the effectiveness of training under any circumstances, and no systematic attempt to do so was made by the study team. However, from the short but intense field experience of the team, some observations can be made.

The quality of the staff at upper and mid-levels (e.g., project director and zone chief) is impressive. Both have had substantial technical training and field experience, and they perform competently. Villagers recognize this and respect them accordingly. This was not always the case, however, for zone extension agents were not initially accepted by villagers. Indeed villagers said a few years ago they did not need these extension agents and that villagers knew more than they did. It is unclear whether this was a function of a lack of training, differences in age and experience between farmers and extension workers, or other factors. That skepticism about the zone extension agent, however, does not exist today.

Limitations of the village pump operators and extensionists were noted above, although recent efforts by the U.S. technicians seem to have strengthened the quality of their work.

Judging from the villagers' commitment and participation in perimeter operations, the initial orientation, training, and extension work appears to have been effective. Clearly there are variations. There are model perimeters in terms of organization, debt repayment, production, and cooperation with SAED; and there are those of the other extreme. In addition, individual participation in vegetable and fruit gardens also varies from a few innovators and model farmers who have sought extension assistance to many who have not. However there are now eight village demonstration plots where there were none a few years ago. The fact that requests for opening additional land have increased in the past 3 years suggests that orientation, training, extension, and followup have had some impact.

The Water Management Synthesis Project (WMSP) report of 1982 generally noted the overall lack of training at the village level. This is less the case today. Considerable progress has

been made in teaching villagers improved cultivation techniques, particularly row planting, fertilizer usage, and systematic weeding. There is a general acceptance of the need for the groupement to have managing officers, especially the president and treasurer. No systematic attempt was made to assess villager participation in extension efforts, but discussion with farmers, the SAED staff, and U.S. technicians suggests an awareness of the improved techniques and a basic commitment to seek out advice and assistance.

## 5. PARTICIPANT TRAINING

There is no systematic attempt in this project to select Government personnel to eventually assume the positions of USAID contract technicians and to undergo long-term training as preparation for these positions. Beyond \$30,000 budgeted in the Project Paper for U.S. short-term training, no further provision for training was made.

As the project developed, it became clear that long-term training would be necessary. At the time of the team's visit, three candidates were studying for B.S. degrees in agricultural engineering, agronomy, and agribusiness in the United States. Two of them may continue to the M.S. level. These two were both former project directors at Bakel. There were short-term courses for a few Senegalese. There was no urgency to get the long-term participants back to Senegal and certainly none to get them back in place on the project by the time U.S. technicians complete their contract in December 1985. One technician will be replaced by the Bakel assistant director, who also acts as chief extension agent for the project. It is unclear who will replace the other U.S. technicians.

## APPENDIX G

### CONTEXTUAL FACTORS

#### 1. INTRODUCTION

As noted in many Bakel Small Irrigated Perimeters (BSIP) project documents and discussions, AID and the National Society for the Development and Exploitation of the Senegal and Faleme River Basins (SAED) technicians and bureaucrats characterize Bakel as an isolated enclave. They cite the lack of administrative structures, the heat and dust, lack of amenities, arduous transportation and logistics, and the conservative nature of the local people as major contextual factors inhibiting smooth project implementation. Although all note positive changes over the 8 years of project implementation--paved roads, radio communication, and better office facilities--the isolated enclave mentality persists.

In Bakel, on the other hand, one is struck by the worldliness and wealth of the population relative both to other areas of Senegal and to the Sahel in general. A long-time resident Lebanese trader in Bakel speaks of "trunks full of money" hoarded by simple farmers. The villagers speak of "our little money orders" from France to help tide them over, money orders that totaled \$10 million per year in the late 1970s and that place the central Bakel Post Office second only to that of downtown Dakar in processing cash from abroad.<sup>1</sup> For these people, the roads are bad, but they can fly on the once weekly flight or use their boats to get around. Communication is difficult, but the town of Diawara marshalled migrant remittances to construct its own post and telecommunications unit that links it directly to Paris without having to pass through Dakar. Bakel town residents point to the 24-hour electricity, the new (second) cinema, the new cold storage unit being built with Japanese assistance, the new modern hospital being built with World Bank assistance, and the numerous and modern village clinics being built with community (migrant remittances) funds, and Bakel then gives the impression of a boom town. Life is hard, the rains are less each year, but the farmers and herders of the area are definitely "making it" and do not characterize themselves as particularly isolated or removed from the world.

The impact on BSIP management of the almost self-fulfilling prophecy of Bakel as an isolated enclave is discussed in Section 2. The lack of a common perception of the socioeconomic

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<sup>1</sup>Richard P. Miller, "Peasant Autonomy and Irrigation: Innovation in the Senegal River Basin," Ph.D. Dissertation, Northwestern University, Evanston, Illinois, June 1984, p. 142.

characteristics of the area, and its effect on project implementation and management, is discussed more fully in Section 3. Section 4 examines the interplay between SAED's evolving policy and independently evolving farmer initiative and its effect on the most critical project output, crop production.

## 2. REMOTENESS AND ISOLATION: THE ENCLAVE MENTALITY

Whereas in many other development projects in remote areas planners and managers have been able to cope with--indeed surmount--physical and logistic barriers, in BSIP it appears that SAED/St. Louis and USAID/Dakar let the physical environment win. The remoteness and difficult logistics appear to have been a convenient excuse when things did not go well, as, for example, when the contract for headquarters construction entered its fifth year with no end in sight. A slightly more aggressive approach to overcoming some of the difficulties might have mitigated some of the implementation problems, as discussed below.

### 2.1 Special Support for Personnel in Remote Areas

The May 1977 AID Project Paper argued strongly for a waiver to enable contracting of the on-site former International Company for Rural Development (CIDR) French technical assistance team because (1) they had been in Bakel 3 years and the project would thus avoid traditional startup problems; (2) they had built credibility with the local people and replacement would destroy confidence in the organization (whether the organization referred to is CIDR or SAED is not noted); and (3) the cost per person-year of technical assistance through this mechanism would be less than one-half the cost of one person-year of U.S. technical assistance. Unfortunately, the French technicians appear to have observed the salaries and perquisites of other AID-funded technicians in Senegal and determined they were being treated unequally. About 1 year into the project, they demanded that their salaries be approximately doubled, and their contracts were terminated. It took AID almost 2 years to field another complete technical assistance team, this time in the form of Mission-executed personal services contracts. Although AID Mission personnel assumed project logistic burdens, the three contractors were essentially left to their own devices in scrounging for furniture, establishing systems for support, and trying to maintain healthy and happy lives in remote Bakel. It has not been easy, and those who have stayed in Bakel are to be commended for their perseverance and commitment.

On the SAED side, it was not until approximately 1982 that well-qualified personnel started being posted. To SAED/St. Louis, Bakel was, in terms of geography and career, the "end of the line." Official housing was rented and in poor condition, office space was essentially under the trees outside a three-room rented local house, and material and moral support from St. Louis was minimal.

This relative isolation from home offices has tended to have several positive and negative effects. On the positive side, a team spirit based on a sort of "underdog" psychology was built. People posted in Bakel often declined to have their families join them because of the lack of proper housing and amenities, tended to work longer hours, and devoted more energies to the project than they might have in an area with more to offer. With the lack of frequent communications and visits from St. Louis and Dakar, a familiarity with and commitment to the client group (the farmers) was stronger in some cases than ties to the home offices.

On the negative side, the project suffered the aforementioned 2-year period with a locally disliked SAED Director and only one expatriate adviser. Extension personnel were generally poorly trained and less knowledgeable about soil-crop-water relationships than the farmers. The credibility of SAED was strained; in 1982, the farmers revolted, noting they were getting virtually nothing from SAED except an increased debt burden and announcing they would prefer to work independently. A delegation of village leaders actually took their case to the office of the President in Dakar and succeeded in having the SAED Bakel Director removed; personnel morale at that point was extremely low and operations slowed to a halt.

SAED and AID began to take seriously the need for more technical and material support to the project and quickly took a number of steps. A project review was undertaken by a team of internationally renowned irrigation experts from the AID-funded Water Management Synthesis Project (WMSP) in November 1982, with several positive technical outcomes. The 6-year-long construction effort for the new SAED office and residential complex in Bakel was accelerated and finally completed in mid-1983. Several more highly trained SAED personnel were posted, including a new director, an experienced accountant, and an experienced credit manager. Direct radio communication with St. Louis was established in late 1983, shortly after the move to the new headquarters, and a number of lower level personnel started being selected for training. The 1983-1984 campaign marked a new beginning for the project.

It appears, in sum, that central-level management realized that basic personnel support--adequate offices and residences and in-service training and career advancement--enhanced its

abilities to recruit and post better qualified personnel to the area. Further, it learned that provision of technical and material support would enhance the actions of those committed few who had stayed during the difficult period. The realization that these steps could have been taken earlier, or at least more quickly, may be obvious only in hindsight, but is certainly applicable to future efforts in similar areas.

## 2.2 Prior Planning for Logistics Needs

The Project Paper noted summarily that "agricultural inputs, fuel, etc. were arriving as planned prior to the rainy season and were placed in villages while the roads were passable." The document included no analysis of the different logistic needs between what they had observed for the existing 100 hectares and what might be needed for the planned 1,800 hectares. The design team also noted that it was providing for purchase of trucks under the technical assistance contract so that the three technicians could not only bring personal supplies from St. Louis but also "use their own trucks to bring in inputs." The fact that the roads were unpaved and closed much of the time, that inadequate storage existed in Bakel and at the villages, and that some detailed analysis of needs and development of pipelines for items subject to national shortage (e.g., fertilizer) might be useful does not seem to have entered into the plans.

Part of the 1982 village "revolt" (see Appendix A) stemmed from erratic and inadequate provision of critical inputs such as diesel fuel, fertilizer, seeds, and spare pump parts. The November 1982 WMSP Review, discussing provision of diesel fuel, noted: "The procedures we observed being used for fueling the diesel engines on the river floats were crude beyond comprehension." The report recommended construction of 2,000-liter tanks to provide "a safety margin against fuel delivery interruptions." This recommendation has been successfully implemented; tanks are filled prior to the rains, and in the past 2 years, few problems with inoperable pumps caused by lack of diesel fuel have occurred. The same report chastised the project for not establishing village-level storehouses for prestocking fertilizer and seed, as most was stored in groupement leaders' homes under less than healthy conditions. This recommendation has also been implemented, with 23 storehouses being almost completed in 2 years and some already operational. A seasonal planning system for critical inputs now is in effect in the villages and at SAED/Bakel and SAED/St. Louis. A simple finding that better planning would have alleviated many of these problems cannot be overstated. More timely provision of short-term technical assistance to share ideas with and support long-term staff and to help overcome critical bottlenecks should also be planned before problems get out of proportion.

### 3. SOCIOECONOMIC ENVIRONMENT

#### 3.1 Characteristics Affecting Project Management

The isolated enclave perception of outsiders notwithstanding, the Soninke and Ffulbe-speaking people that inhabit the Bakel area are internationally well traveled, with a sophistication and outward orientation unusual in rural Africa. Their worldliness stems from historic river travel and trade in Africa and up to the Magreb; it has been vastly accelerated by an increased international migration beginning around 1914, initially through the French merchant marine. According to Miller, "since independence, approximately one-half of the active male population of the Soninke are migrants at any given time, with proportions usually varying between 40 percent and 60 percent, according to the village. Among the elderly and now returned to the home village, 80 percent have migrated at least once."<sup>2</sup>

The Ffulbe-speaking people of the area--Fulanis and their sedentarized relatives, the Toucouleur--also migrate, although to a lesser extent. Whereas the estimate of Soninke migration is 50 percent of the adult males at any given time, among the Toucouleur it is closer to one-third. Toucouleurs engage more in urban migration within Africa than the Soninke, are more apt to take wives and children with them, and generally send less money home. Their strong history of African migration, however, through the rivers and on the range, also provides them a worldliness not often found in remote corners of the Sahel.

This outward orientation has had a strong impact on the implementation of BSIP. The original AID Project Paper included as a stated purpose: to introduce the technologies of irrigated culture in 23 villages along the river in the Bakel area and to demonstrate the feasibility, both technically and economically, of irrigation in the area. The Project Paper also noted that sociological considerations were great. In hindsight, AID could not have picked a better "test bed" in terms of economic or social criteria for its pilot effort. Many of the returned migrants had seen irrigated farming--indeed, the project was actually initiated by a returned migrant--and were not hesitant about the new technology. They had experience with group organization for development purposes and had already tried several collective efforts. Many spoke French and had learned to deal with foreigners, contracts, and cash transactions. On a socio-cultural basis, the Soninke in particular and the Toucouleur to a lesser extent were quite open to the pilot effort.

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<sup>2</sup>Miller, p. 140.

On an economic basis, the relatively high cash income in households and villages has also had several effects on project management. The Project Paper analyses viewed the irrigated perimeters as additional income for the farmers. The economic analysis assumed that traditional dryland production would meet most consumption needs and that the irrigated production would be sold for cash. The analyses were based on the assumption that the majority of production would be rice, the best cash crop, and that the people would continue to eat the dryland sorghum and millet. Little information in the Project Paper's economic or social analyses was presented on the impact of cash remittances on the assumed benefit streams. The Project Paper in fact assumed that only \$1 million per year was flowing into the villages and noted:

The PP [Project Paper] team has not programmed these funds as a local contribution because: (1) the risk factor of investing in a totally unknown agriculture is too high to be acceptable to the villages; (2) this money is used in other community and private projects...; and (3) if the farmers were to rely on this money, financial control would lie in the hands of the select 20 percent of the village which is the most wealthy, thus raising serious equity problems.

This summary write-off of a major financial resource skewed the original economic and financial analyses; the continued reluctance of AID and SAED managers and researchers to include remittances as a financial resource in the household and village economy continues to promote unrealistic assumptions about project viability.

Sample studies undertaken in 1978 and 1979<sup>3</sup> show that remittances may account for 50 to 75 percent of total household income, with traditional agricultural production accounting for less than 10 percent. Remittances have been coming in to the Bakel area for at least two, and often three, generations and are an accepted means of livelihood. Agricultural production has commonly been used for household consumption, social obligations, and visible demonstration of wealth while stored; cash needs are commonly met by remittances. Thus although SAED and AID assumed that the incentive for irrigation was increased cash

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<sup>3</sup>J. Y. Weigel, ORSTOM, "Irrigation and the Socio-Economic System of the Soninke in the Bakel Region (Senegal River Valley)," and Michele Fieloux, summary of "A Socioeconomic Study of a Toucouleur Village, Bow," both papers presented for the Workshop on Sahelian Agriculture, Department of Agricultural Economics, Purdue University, May 1980.

income, it appears that farmers adopted it more as a means of "hedging bets" against drought. As Keita puts it, "crops that occupy most of the household farm lands (e.g., dryland sorghum, millet and maize) contribute to a large extent to net agricultural returns whereas irrigated farming reduces the risks involved to the traditional farmers."<sup>4</sup>

In the past few years, it may be that the remittances have actually sustained the project. As noted in Table A-1 in Appendix A, rainfall has decreased in the area over the life of the project to the point that many villagers and bureaucrats discuss the days "when it rained" with a finality that assumes those days are over. For the last 2 years, dryland production has been virtually nil, and marketing of "surplus" irrigated production has been minimal. With the exception of some of the larger perimeters, the team was told that the farmers are now irrigating to eat, not to sell. Credit repayment--when made at all--is made with cash from migrants. Cropping is generally shifting to only one-half rice, with the rest maize and sorghum. People in villages are now eating rice at their mid-day meals, a practice not common prior to 1975. Rather than being an economic boom, in sum, irrigation has become one more means of subsistence.

As discussed in other appendixes, SAED management was slow in identifying this phenomenon but has finally accepted it. Farming collective fields to pay for inputs on credit is rare, and the accepted method of payment is to collect from individual groupement members when the money orders come in. Although the cash remittances are, in fact, sustaining the project according to the people and SAED, it may be an illusory sustainability. France is suffering its own economic woes and has begun tightening restrictions on migrant labor. If the remittances decrease, the financial viability of the irrigated perimeters may become key to survival. At this point, however, with the tradition of relatively high cash income from remittances, neither farmers nor SAED appears concerned about pressing the issue.

### 3.2 Organization of Productive Resources

Existing Soninke and Toucouleur organization of the classic productive resources--land, labor, and capital--has served as the basic structure and evolved to meet the needs of perimeter

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<sup>4</sup>Moribaidjan Keita, "The Bakel Small Scale Irrigated Perimeters: An Economic Analysis of Agricultural Production," (USAID/Agricultural Development Office, Dakar, June 1983), p. 173.

management. The first two of these factors are briefly discussed below. Management of capital is discussed in Appendix E on financial management.

### 3.2.1 Land Tenure and Distribution

SAED's initial experience with irrigation along the Senegal River was with large (10,000 hectares) schemes using advanced technology and central management. Implicit in these early (1963-1968) schemes was the relocation of farmers living on the land and the ceding of rights to the land to the State. Although modern law in Senegal states clearly that all land does, indeed, belong to the State, as long as no improvements are undertaken the authorities generally leave tenure to be decided on community terms. With the introduction of irrigation at a high cost to the State, land is usually ceded by the village authorities, and farmers become, in essence, landless laborers on their former land. SAED's initial work on the large perimeters of the delta has generally followed this policy; it has been applied in a less centrally managed variation on the medium-size perimeters of the middle valley.

In the small, community-managed perimeters of Bakel, a different approach is followed. Site selection for the overall perimeter is undertaken by the village authorities with technical advice and assistance from SAED. The site is generally fallow dryland fields that "belong" to nobles of the village. There is no perceived or apparently real shortage of land in the area. Although most villagers interviewed acknowledged that all land in Senegal belongs to the State, there appears to be a tacit understanding in BSIP that as long as the community works the land, it is theirs. In one case, after a dispute, people from one village were required to leave a 10-hectare perimeter of land that they had borrowed from another village; SAED has not assisted the owner-village in cultivation and in fact used the plot for experimental purposes one season. Although this one case cannot be interpreted as an overall trend, it is suggested that it provides a strong incentive for villagers to continue cultivation lest they lose their traditional land rights to the State.

Distribution within the perimeters varied widely among the groupements, ranging from wholly individual to household to collective plots and all combinations thereof. It appears that the initial 12 villages all started as wholly collective endeavors under the guidance and tutelage of technicians from the French nongovernmental International Company for Rural Development (CIDR). As SAED staffed up in the area and AID funds became available, a shift occurred. The original villages began

redistribution, generally along the lines of dryland culture, and new villages began the same way. That is, among the Soninke villages land was distributed either by household or by individual, often with individual plots spatially clustered by household. In most cases, again following dryland custom, women's individual plots--the proceeds of which are theirs alone--were one-half or less the size of the men's plots, which must feed the family. In the Toucouleur villages, plots were generally distributed individually, but only to men. Collective fields "to pay the debt" decreased gradually among the Soninke to a current range of 0-10 percent of the perimeter. Only one collective field has been undertaken in later years among the Toucouleur. Plots in both cases were usually assigned to a household or individual through a lottery system.

As perimeters were augmented, it appears that even stronger shifts occurred. The most common current distribution method most closely follows the Soninke dryland system of allocation of household land, with one family (collective) field and smaller plots for individual adults within the household. Because allocation of this improved land is done in the name of the male head-of-household only, it raises some disturbing questions about women's equal and independent access to modern productive resources. Given the current stress on autonomous perimeters and community management, this community-managed land allocation appears sound. The two or three detailed scholarly works that have investigated specific villages suggest that more and better land is probably going to traditional nobles' households; given the short visit of the team, this could not be verified.

Of major concern in land allocation and distribution remains the question of the relation of the State--in this case SAED--to the community. It appears that as long as the community continues to cultivate the perimeters productively and exhibits goodwill in its dealings with SAED, the villagers can assume "ownership" on a traditional usufruct basis. SAED's current 3-year plan for 1984-1987 (second Lettre de Mission) notes that in 1980/1981 it began to distribute irrigable land to groupements without a specific timeframe, and at the same time it stopped requiring new internal land distribution each year, leaving it to the groupement itself to decide. Although this is encouraging for peasant empowerment, actual "ownership" is still an issue. SAED senior managers state that they have the issue under study and that they will probably need to present a plan to the National Assembly for preserving the rights of the farmers. As the Manatali dam comes on-stream and the riverine nations begin to push toward higher national productivity and progressively larger perimeters requiring more sophisticated management, however, one wonders what the status of these community perimeters will become.

### 3.2.2 Allocation of Labor

The few scholarly time/budget studies published on irrigated and dryland cultivation among the Soninke and Toucouleur of Bakel suggest broad trends similar to other African situations: women work more days than men, and irrigated agriculture requires more labor than dryland. In addition, the available published research suggests that in recent years more effort, and proportionately more land, is going into irrigation activities.

Several AID-funded reports and evaluations have devoted considerable time to assessing labor shortage problems on the irrigated perimeters. The WMSP Review notes as a summary conclusion that "labor saving technologies must be implemented because with present techniques labor is a serious production constraint." The previously cited AID-funded report by M. Keita assumes at the outset a labor shortage caused by male migration but notes that the villages seem to be meeting the shortage by spreading tasks, substituting women's labor for that of men, and hiring labor. The team investigated this perceived problem of labor shortage and found the following:

- Neither villagers interviewed nor SAED/Bakel staff perceive a problem with labor shortage. As summed up by one SAED/Bakel technician with the full concurrence of two Soninke perimeter presidents, "The postal money orders of the migrants replace their labor."
- With the exception of heavy land clearing (primarily male) and weeding (primarily female), there exists a traditional substitutability between male and female labor in agriculture, which is being applied to irrigated fields.
- Toucouleur women have traditionally participated less in cultivation than Soninke women, and the pattern is holding in irrigated efforts.
- Women's time in both cultures could be made more productive by the introduction of more rice decorticators into the area, because hand-milling of rice is very difficult and time-consuming.
- In both groups, use of hired labor in traditional dryland agriculture--either on a sharecropping or wage basis--was not uncommon. On the irrigated perimeters, use of hired labor seems to average 10-20 percent of the total person-days, with a range of zero to about 40 percent per perimeter and zero to 100 percent per

individual plot. Recruitment of hired labor--often Malians from across the river--does not appear to be a problem.

It is suggested that the concerns over labor constraints discussed above stem from a narrow view of the irrigated perimeter as a closed system, and that viewing it within the total household economy minimizes the constraint. Keita examines the constraint within the total household agricultural system (but does not examine the relationship with migrants' cash remittances) and concludes that although a shortage does occur with irrigated culture, households are optimizing labor inputs to agricultural production. This team concludes that within the total household production and income systems, including the contributions of migrants through remittances, and given a fixed access to irrigable land and water, labor and most other resources are probably being optimized.

#### 4. SAED POLICY AND FARMER INITIATIVE: EVOLVING CRITERIA FOR CROP CHOICE

A more detailed analysis of SAED's organization and management is found in Appendix D, and discussion of farmer organization and management in Appendixes B and C. In this section, the impact of a dynamic SAED policy during the life of the project, and its interplay with a growing farmer initiative in irrigated agriculture, are analyzed for the most critical output of the project: crop production.

The original initiatives in irrigated agriculture in Bakel stemmed not from Government of Senegal intervention but from the efforts of a returned migrant farmer to the area. The first meetings between SAED technicians and the farmers occurred in early 1975, when 12 villages were already participating in collective agricultural development activities. In a detailed account of a meeting in April 1975 in one village, it is reported that the villagers were skeptical but that the SAED technicians informed them that the Government had given the river valley to SAED and that they were required to work with SAED: "It is God that has installed SAED. You must collaborate with SAED; I counsel you to work with it. To not work with SAED, that would be like a son refusing the heritage of his father."<sup>5</sup> After many meetings, the villagers accepted the advice, and the first contractual period began.

During this early era--which was to last until approximately 1982--SAED itself was operating under a mandate, which although not God-given, was all encompassing. It was one of several Regional Development Authorities in Senegal, and its

responsibility was to develop the Senegal River basin. One stated objective was the reduction of the overall national food deficit. With the fall of the world market for peanuts-- Senegal's main cash crop--import substitution of critical food-stuffs became a theme. SAED was viewed as the agent to overcome the deficit of what the bureaucrats and politicians of Dakar perceived as the preferred food in Senegal: rice.

The farmers of Bakel, on the other hand, were anxious to refill their granaries, which had been depleted during the 1968 to 1973 drought, and had no particular preference for rice. Sorghum, millet, and maize were preferred crops in the Bakel area. Sorghum cous-cous was eaten with milk as a porridge at breakfast and with meat and/or vegetables at other meals. The initial collective work had focused on either vegetable gardens for consumption, or sorghum. The idea of producing rice to feed the civil servants of Dakar was not exactly what they had in mind when they had formed their groups.

This lack of a common production objective was compounded by the special soils of the area. The early SAED/Bakel technicians had learned their trade in the flat areas of the delta, areas blessed with soils with a high clay content suitable for rice. A pre-reconnaissance-grade soil survey of the Bakel perimeter, undertaken by OXFAM and summarized in the BSIP Project Paper, stated that only about 10 percent of the soils were well suited for rice production, with an additional 30 percent irrigable and suitable for "rice, sorghum and cereal crop production." The remaining 60 percent of soils were described as "well aerated...with good capillary action, permeability and drainage. They are irrigable and best suited for wheat, sorghum, millet, peanuts and other vegetables but rice production is possible." The farmers, knowing their soils well, had traditionally undertaken some flood recession agriculture (walo in the local languages) on the former 40 percent and grown sorghum and millet on the latter (dieri). SAED's commitment to producing rice on all of it, regardless of type, may have been perceived as unusual by the farmers, but they gave it a try.

The trial period lasted 1-2 years in most villages before frustration set in. Trying to maintain the new pump sets with inadequate diesel fuel and assistance from SAED was bad enough, but having the water drain through the soils so quickly that the rice suffered was absurd. Pumping enough water to maintain the rice on the dieri soils would have been far too costly, so the farmers began shifting to other irrigated crops, notably maize.

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<sup>5</sup>Adrian Adams, Le Long Voyage des Gens du Fleuve (Paris: Librairie François Maspero, 1977), pp. 140-141.

SAED, focusing on rice, provided no technical or material assistance for this maize production, nor for the limited farmer-initiated experiments in irrigated sorghum. It is thus impressive to note that in the early years, before the farmers had learned proper row planting and furrowing techniques, yields were an acceptable 2.5 tons per hectare. Unfortunately, sorghum yields are not measured on farmer fields to this day.

In addition to the inappropriate technical package being offered by SAED during this period, the economic incentives of irrigated rice were also inadequate. The annual contracts signed between the groupements and SAED required that the former sell all of "its production surplus after satisfying consumption needs" to SAED. SAED purchased the rice at the fixed Government price, which was well below the parallel market price or prices in Mauritania and Mali. It appears that the farmers were more interested in irrigation as a means of decreasing risks in subsistence production, or as a means of ensuring consumption, than in any cash the effort might generate. With the low SAED prices, they simply declared most production as necessary for consumption and refused to sell. Some sales did take place under pressure, and some debts were paid, but generally the 1981-1982 cropping season was marked by increasing farmer debt to SAED and increasing SAED debt to the Government. With no rice to market, SAED could not generate the desired funding for its own operations.

The crisis of 1982, with several villages refusing to continue working with SAED, fortunately occurred concurrently with the issuance of a new SAED policy, as articulated in its first Lettre de Mission, or first 3-year plan. Under this new policy, SAED decentralized the management of field operations to field offices, and SAED/Bakel became the "autonomous delegation of Bakel." The annual production contracts became biennial, and the autonomous delegation of Bakel removed the much-despised marketing clause, stating that it was too expensive for SAED to ship Bakel paddy elsewhere. The new policy also included an emphasis on shifting more responsibility to the farmers; in Bakel, this finally meant less friction between the already responsible farmers and SAED. In sum, from the Bakel perspective, the policy finally matched the producers' perception of their role.

This policy mandate was strengthened through the 1984 issuance of a new Government agricultural policy and a concurrent second Lettre de Mission from SAED for the period of 1984-1987. Both documents stress the decreasing importance of parastatals in production and marketing and SAED's gradual shift to a planning and research institution; both also stress the increased reliance of the Government on the small farmer and the private sector. Although pricing has yet to come entirely in line with the policy, signs are very encouraging.

As of the team's visit of 1985, groupements were operating without a contract with SAED because, as one perimeter president explained, "We've been through a lot and know each other well enough now." The SAED/Bakel demonstration farm was conducting trials in rice, maize, and irrigated sorghum and providing training for villagers in improved techniques for all three. The new joint committee was planning its first meeting. Farmers were marketing what they wanted; they also noted that they were now eating rice. With a new drought cycle evident, both the farmers and SAED are pushing to open more land to irrigation, and people from villages in the interior are applying to join groupements. It appears that in the foreseeable future the planners and producers may work in tandem.

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