

PROMOTION HUMAINE COMPONENT
TO THE
SENEGAL RANGE AND LIVESTOCK DEVELOPMENT PROJECT
(No. 685-11-120-202)

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PROJECT TITLE : SENEGAL RANGE AND LIVESTOCK DEVELOPMENT

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I. OVERVIEW

A. Introduction

The Senegal Range and Livestock Development project was approved on December 20, 1974 as part of AID's medium-term response to the Sahelian drought. This project is to be situated in the eastern area of Senegal, an area forming part of the Sahelian zone, populated by sedentary cattle-owning people who remain largely unrelated to a modern market economy. The express purpose of this project is to assist the Government of Senegal in realizing more fully the potential for food production of Senegal's northern and eastern rangeland areas. This is to be accomplished through the introduction of modern range and livestock practices to populations inhabiting a well-defined project zone within that larger area. Through this effort the Government of Senegal will increase its understanding of effective means for introducing new practices throughout the wider region. It is also intended that through this effort the improved living standard accruing to the population in the project zone will make the new practices attractive to similar peoples in surrounding areas.

Because the project seeks to introduce practices and attitudes which are often at variance with traditional views, the project's educational aspects are of fundamental importance. In the broadest sense of the term, of course, education (the changing of perceptions and attitudes) is the

entire thrust of the project. Even in the narrower sense of the term, however, education (the transfer of skills and knowledge) remains a vital component. Because the project places special emphasis on education in both senses, the Project Paper (PROP) included an education component which the PROP left open to further definition and to additional funding as might be justified as an integral part of the final project design.

The purpose of this project amendment, therefore, is to fulfill the PROP requirement for a detailed description of, and rationale for, the project's educational component. The description and rationale of this component have been developed as part of the detailed design study undertaken in June-July, 1975, by the Consortium on International Development (C.I.D.). The PROP provided for this detailed design study in turn, as a major part of Phase I of the approved project.

This amendment, therefore, takes as its point of departure, the C.I.D. project design. A detailed description of the education component itself then follows, together with the recommended timing and estimated cost of each of its elements. The manner in which the education component supports the goals and purposes of the project as approved, and the final design as recommended, is made apparent throughout the pages which follow.

B. The Senegal Range and Livestock Development Project (Bakel)

The Senegal Livestock Project aims at increasing the quantity and quality of off-take consistent with approved range management practices, thereby increasing producer income in two contiguous project zones in the Bakel Department of Eastern Senegal. As conceived in the detailed design, the Toulékédi zone (88,000 ha) will serve as the initial area of concentration, leaving development of the Sarré perimeter (43,000 ha) until

the third year of the project, at the discretion of the project authorities in consultation with the GOS and AID.

No recommendations appear in the C.I.D. design proposal for the Sarré zone, pending further investigation. The plans which follow therefore apply exclusively to planning for the Toulékédi zone. Even these plans, of course, will be subject to later adjustments as the population of the area becomes further involved in project implementation and management.

The Bakel project seeks to bring about three effective results, which may be understood in a rough logical sequence. The project seeks, first, to bring range resources (water and forage) into equilibrium with the livestock dependent upon it. Achieving this balance will entail the deconcentration of livestock from around villages where livestock presently receive water and, at night, shelter. It will also entail the culling of herds to eliminate old and inefficient animals. It is to further ensure this balance of animals with forage and water that the project will promote the formation and protection of 31 surfacewater ponds, in place of wells. To limit the number of animals with access to the pastures, the entire zone will be closed to animals from outside by zone borders (effective fire-breaks) totalling 465 kilometers in circumference. To protect the range against fire within the project area, the zone itself will be subdivided into eight grazing management units, demarcated by 321 km of internal fire-breaks. These firebreaks will be reinforced by watch towers and a specially equipped volunteer fire fighting force.

The second result which the project seeks to achieve, following from the first, is the improvement of the quantity and quality of livestock offtake for commercial sales. This objective also will require that new

practices be adopted, including the separation of village milk herds, better calf nutrition, earlier weaning, a breeding program, regular animal health practices, and marketing structures for the commercial sale of livestock. The project will encourage the sales of calves for further fattening in food surplus areas nearer to urban centers.

The pay-off of all the preceding activities, the third project objective, is the improved condition of the resident population. This objective depends upon the achievement not only of higher per capita income from livestock sales, but of equal importance ^{upon} the confidence and ability of the community so to manage its activities and resources as to achieve the improvements desired. To this end, the project seeks to introduce more advanced forms of organization including cooperatives, herder associations and a zone Council. In support both of greater productivity and of improved living standards, the project seeks to convey a familiarity with basic health and nutrition measures, literacy in the local language(Poular), and, in general, a broader vision of what the community may achieve through its own efforts.

All of these new attitudes and practices must be learned, then reinforced by positive results. Education becomes, therefore, a basic concern of the project, in the teaching of technical skills as well as in the structuring of new organizations, the instruction in complementary skills, and the encouragement of the new orientations required for change.

The teaching of technical skills through standard extension methods will be covered in the C.I.D. report. The purpose of the following section is to detail all other education contributions to the project which are planned to support and complement the work of the program technicians.

C. The Education Component

If Senegal's technical field services and formal education system were functioning today in the manner in which it is intended they one day shall function, there might be no requirement for the following education component. This component has five functions:

first, a sociological function, to provide a detailed baseline survey of attitudes and practices, which may be updated at yearly intervals, and which will serve to orient project technicians and other staff to working with the local population;

second, an orientation function, in the initial stages, which will prepare the population ^{and project staff} to participate in the project activities;

third, an organization function, which will assist the people of the project area to form various cooperatives, groups, and other associations to shape and manage project activities;

fourth, a strictly complementary extension function to the regular training element of the project, preparing groups to receive and make the best use of technical instruction;

and fifth, a straight instructional function, imparting additional knowledge and techniques which, together with the new technical practices, prepare the way for better living conditions. Such additional areas of instruction will include maternal and child health, vegetable gardening, poultry care, milk production and handling, and functional literacy.

Ideally, perhaps, each of these categories of activities should be adequately handled by standard "formal" institutions: either by the school system, or by the extension services themselves. In Senegal at the present time, however, few schools serve the rangeland areas of the East and North.

There is no school whatever in the Toulékédi zone, at present. Even where schools do exist, however, they do not yet convey practical rural skills and knowledge. The current reform of primary schooling in Senegal will require many years before schools became an effective means of raising rural living standards. Senegal's extension services, meanwhile, remain oriented in the formal tradition towards the delivery of special knowledge and techniques. Extension services are not yet staffed with personnel who, possessed of a solid technical background, are at the same time well practiced in teaching and organizational skills.

To meet these deficiencies, there have grown up in Senegal over the past fifteen years a series of training services, each independent of one another, each having enjoyed its own internal or external source of support. First among these, both in age and in size, is the Animation Rurale program, a service of government since independence much in the community development style of Anglophone areas. Animation Rurale has concerned itself with organizing rural peoples to formulate and then to realize their own development objectives, drawing upon the help of the technical departments of government. A second in this series of rural training services is the Maison Familiale program, derived from France, which is concerned with practical, all-round training at village level, especially for men and women in the 15-25 year age group. In addition to these two, there is also the Literacy program, the Rural Professional Training (FPR) program to train "pilot" farmers, artisans, and builders, and, most recently, the Practical Middle-Level Training (EMP) program, principally for the 80% of primary school leavers who do not gain entry to secondary school. Whereas the ILO founded the FPR program and has funded it until this year, EMP is receiving IBRD assistance.

Growing up from separate origins, then, with independent sources of financial support, but responding to the same sorts of demands, these non-formal training programs are all to some degree overlapping. In an effort to coordinate rural training more effectively, the Government of Senegal in 1973 brought the five programs together under a central direction, entitled Promotion Humaine. Early in 1975, Promotion Humaine was elevated to the rank of a State Secretariat formally attached to the Ministry of Education.

The original Bakel project design team recognized the present limitations of the existing formal education system and extension services. The team therefore approached the Director of Promotion Humaine and subsequently recommended that, subject to further investigation, funds should be provided under the project to ensure the participation of Promotion Humaine. Six months later, the AID team responsible for recommending the Development Assistance Program (DAP) for Senegal made a further exploration of the services offered by Promotion Humaine. Based on this review, the DAP report (March 1975) proposed that AID should consider possible long-term support to Promotion Humaine, but that this support should begin through modest and concrete measures. The DAP specifically recommended that AID should start U.S. funding ^{of} Promotion Humaine activities in direct support of one or two of the AID medium-term production projects, in livestock and in cereals.

Upon DA confirmation of the original Bakel Team's recommendation, therefore, AFR/CWR proceeded to procure the short-term services of an American advisor whose initial task for Promotion Humaine has been to assist in the detailed planning and execution of the present education component. Accompanied by two Senegalese colleagues from Promotion Humaine, the U.S. advisor participated as a full member of the C.I.D. design team in the

three week site visit to Bakel (June 19 - July 14). His report was issued after full consultation with the CID team and with Promotion Humaine headquarters in Dakar. This report, together with the full participation of the Promotion Humaine planning office in Dakar, form the basis for the activities proposed, and the funding requested, below.

II. Promotion Humaine's Role in the Livestock Project

A. Sociological Evaluation

Because this project seeks to change attitudes and practices, the project lays emphasis, first, on documenting the present perceptions and behaviour of the some 1,000 people inhabiting the eight villages of the Toulékédi zone. To perform this task and to reevaluate this data as the project progresses, Promotion Humaine will engage a resident sociologist, and will accept responsibility for the effective design and execution of his survey. The resident sociologist, preferably a Senegalese national, will make an initial two month survey of the project zone, and of the surrounding area as may be appropriate, well in advance of the training of personnel who will be engaged in project implementation. His report will serve not only in the preparation of all project personnel (including U.S. technicians), but it shall be prepared in such a form as to serve as a reference point for the periodic evaluation of the change in attitudes and practices in the project zone. It is intended that Promotion Humaine will employ the same resident individual to perform the subsequent evaluation studies through to the termination of project activities.

Through the efforts of the above-mentioned U.S. advisor, who is a trained anthropologist/sociologist, together with a representative of central Promotion Humaine headquarters in Dakar trained in livestock, and

the Bakel departmental representative, Promotion Humaine has already contributed a useful initial survey of each village in the Toulékédi and Sarré project zones, and those villages bordering on the project area. This initial survey, performed as part of the C.I.D. detailed design study, has been used to help determine where the perimeter of the project zone should be drawn.

B. Orientation of Those Participating in Project

The project seeks to bring about important changes in the practices of villagers who choose to participate. They must be oriented towards the aims of the project and the benefits that will result. But the project technicians themselves, once they have begun work with the local population, will wish to consider afresh the aims of the project. For the project to succeed, therefore, villagers in the project zone will need to comprehend their present circumstances, and to consider fully the options open to them for steadily improving these circumstances. Project technicians, for their part, will need to fully comprehend the reasons for local attitudes and practices, and to modify project objectives where necessary. Only after the conceptions on both sides have been fully ventilated can a real exchange of ideas begin to take place. Only at that point can joint action be proposed within the basic outlines of the project design.

In order to begin these orientation sessions on a timely basis, Promotion Humaine personnel will enter in the project area several months before the commencement of construction activities. Promotion Humaine project staff will have received beforehand technical instruction and project briefings adequate to fully understand the proposed project innovations and the reasoning behind them. Wherever possible, project technicians and other representatives of technical services familiar with

the project will attend these early orientation sessions. After the beginning of the construction activities, which will take many months to complete, technicians will attend orientation meetings at every opportunity, so that a full exchange of views may take place. Promotion Humaine will continue to organize these orientation meetings well into the construction phase of the project, for as long as appears profitable. Promotion Humaine will also organize orientation meetings for villages outside the project perimeter in an effort to win their support in honoring project boundaries, guarding against fires, and in other ways helping the pilot program to succeed.

C. Organizing Project Participants

If the project is to be effective, organization by the people of the zone will be essential in several spheres. Promotion Humaine will take the primary responsibility for assisting in the formation and effective functioning of all groups and societies having an economic or administrative function within the project area. This work will include the reactivation (and, in some instances, the creation) of livestock and multi-functional cooperatives oriented to the eventual commercial marketing of livestock, milk, and cereals. This responsibility will also involve forming or refurbishing village and zone councils, and ultimately, an assembly coordinating the two project zones. It is these bodies which will ensure popular participation in the making of decisions affecting the work undertaken, the controls on the movement of animals into and within the project zones, and the use of benefits to be derived from the project. Promotion Humaine will also take responsibility for the organization of various work teams, whether on a paid or voluntary basis, to undertake such necessary activities as pond construction, the clearing and maintenance of firebreaks, and the fighting of fires.

D. Support and Follow-up for Technical Extension Training

Comprehensive extension training is a key component of the present project. The extension element will incorporate many of the fundamental concepts of pasture improvement and range management, as well as livestock (particularly cattle) nutrition, breeding, reproduction, health and marketing. The C.I.D. report makes a complete series of detailed recommendations for the content of this extension program. The C.I.D. report also recommends that all U.S. and Senegalese technicians be trained in teaching techniques, so that they may communicate technical points with ease and clarity.

Whereas the project technicians, and the extension specialist in particular, will be primarily responsible for extension work, including all materials and demonstrations, Promotion Humaine will assume responsibility for organizing and managing extension sessions. These sessions may bring together 20-50 participants for up to ten days at a time, requiring food, lodging, and (in some cases) the transportation of people to and from the lesson site. These services Promotion Humaine will provide.

As we have specified before, the Promotion Humaine cadre assigned to the project will have received prior training in key aspects of range and livestock management, as well as a thorough familiarization with the project plan, both in broad plan and in fine detail. This preparation, combined with their participation in extension sessions, will permit Promotion Humaine personnel in the course of their work to reinforce the instruction of the technicians. Reinforcement will include simple, on-the-spot instructions, as well as informal evaluation, relayed to the technicians, of how extension efforts could be made more effective.

E. Supplementary Teaching in Non-Technical Areas

The real beneficiaries of improved rangeland and cattle off-take are intended to be, of course, the population of the project zone. Promotion Humaine will accept full responsibility under the project for demonstrating to people living in the zone those improved practices and techniques most likely to upgrade local living standards: poultry keeping, vegetable gardening, maternal and child health practices including family planning, improved milk production practices and sanitary handling, home economics including clothes making, and other home, dietary, and health improvement practices.

In addition, Promotion Humaine will offer instruction in other activities besides health which are closely linked with both the successful technical implementation of the project and with improved living conditions. Foremost among these is literacy and numeracy training. The illiteracy rate in the project ^{area} is perhaps 93% at present. Literacy, together with related activities (eg., record keeping), will increase local receptivity to techniques and practices. Literacy will also facilitate the formation of cooperatives and other commercially oriented organizations for cattle management and sales.

III. Staffing, Costs, and Timing of the Promotion Humaine Component

A. Staffing

To carry out the activities enumerated above, Promotion Humaine will rely mainly upon two of its services, Animation Rurale and Maison Familiale. Of the two other departments of Promotion Humaine, one (Middle Level Practical Training) is clearly unsuited until such time as primary schools are functioning in the area. A proposed farmer-herder Training Center at

Bellé, administered by the other (Rural Professional Training), will be considered for future funding, either as part of AID's participation in the extensive livestock project which RDO/Dakar has recommended for the Eastern Region of Senegal in conjunction with the IBRD, or as part of the expansion of the present project.

The Chief of the Promotion Humaine team in Bakel, nevertheless, will require a sound technical background in range and livestock management. For this reason, it is likely that this officer will be drawn from the Rural Professional Training cadre of Promotion Humaine. He will be responsible to the Project Director for Promotion Humaine activities directly affecting project implementation. The team chief will also answer to the Departmental Director of Promotion Humaine (in Bakel) for all activities of the Promotion Humaine team within neighboring villages outside the perimeters of the project zone, as well as for the general quality of work performed within the zone. An animateur, provided by Animation Rurale, will assist the team chief in the orientation, organization, and extension support activities outlined above. Again from the Animation Service, but concentrating largely on all topics affecting women, children, and their households, will be an animatrice, who in turn will be assisted by two monitrices. These women will convey concepts of gardening, health and hygiene, millet threshing, the creaming of milk, poultry raising, sewing, fire safety practices, etc. While the animatrice will function primarily to arouse the interest of local families (particularly women) in improving their living conditions, the monitrices will stage demonstrations of specific techniques and will offer simple practical training in the better health and nutrition practices. It is envisioned that these five individuals will be posted

together at the project headquarters, Baniou , located in the south-west corner of the Toulékédi zone.

Also contributing personnel (four men, four women) to the project will be the service of Maison Familiale. One maison familiale will be established in Toulékédi village (20 km North-West of Banliou), within the first project zone. A second maison familiale is planned for the village of Oursoule within the second project zone, 18 months after the first. According to the pattern set by the Maison Familiale service elsewhere in Senegal (and elsewhere in the world), each maison familiale is staffed on a full time basis by at least one instructor and one instructress. At Baniou, however, and at Oursoule, the maison familiale will be staffed by two "moniteurs de maison" and two "monitrices de maison". Again in accordance with well-established practices, these instructors will offer training to young adults (15-25 years old) through a system of alternance: two weeks at the center for instruction in a series of practical skills reflecting their needs and interests, followed by a period of application at home, prior to another period at the center. Instruction will be offered in a range of subjects, including literacy, health, home economics, household gardening, construction and repair, investment and management. The system of instruction, and the age group primarily affected, complement the work of the Animation service described above. All activities of the maison familiale are run in close collaboration with Animation personnel and with the project technicians. The staff of the maison familiale will receive the same pre-project preparation as Animation personnel and will be oriented towards the realization of definite improvements consistent with the goals of the larger project.

These resident personnel will be reinforced by Promotion Humaine operatives at the departmental (Bakel), regional (Tambacounda), and national levels. External staff will visit the project zone not only to contribute support but also to gain insights and experience which may be applied in other areas of Senegal. Promotion Humaine's literacy service will provide trainers on a short term basis who will prepare one literate man or woman in each of seven selected villages to act as a teacher of literacy/numeracy for all interested persons inside the Toulékédi zone and in adjacent villages around the Toulékédi perimeter.

B. Costs

1. Government of Senegal

The GOS will cover salary payments for all regular Senegalese personnel throughout the three year project period foreseen initially in the project agreement.

<u>PERSONNEL</u>	<u>TIME WITHIN PERIOD</u>	<u>SALARY</u>	<u>TOTAL</u>
Chief Responsible	3 yr.	\$4800/yr	\$14,400
Animateur	3 yr.	\$4000	12,000
Animatrice	3 yr.	\$2100	6,300
Monitrice	3 yr.	\$2100	6,300
Monitrice	3 yr.	\$2100	6,300
Chauffeurs (2)	3 yr.	\$1000	6,000
Maison Familiale Moniteur (Toulékédi)	3 yr.	\$2100	6,300
Maison Familiale Moniteur (Toulékédi)	3 yr.	\$2100	6,300
Maison Familiale Moniteur (Toulékédi)	3 yr.	\$2100	6,300
Maison Familiale Moniteur (Toulékédi)	3 yr.	\$2100	6,300
Maison Familiale Moniteur (Oursoulé)	1 yr.	\$2100	2,100
Maison Familiale Moniteur (Oursoulé)	1 yr.	\$2100	2,100
Maison Familiale Monitrice (Oursoulé)	1 yr.	\$2100	2,100
Maison Familiale Monitrice	1 yr.	\$2100	2,100

The total cost to the GOS over the three year period will be: \$84,900

The total value of salaries and per diem expenses for support personnel at departmental, regional, and national headquarters, including literacy, audio-visual, and administrative support, will amount to at least \$15,000 over the 3 year period. The value of furnished housing, office space, and other professional support provided by the GOS to the U.S. advisor is estimated at \$30,000.

2. U.S. Government

a. Technical Assistance

The U.S. will provide one full-time advisor to Promotion Humaine headquarters, Dakar, for the initial two year period of this project. The U.S. advisor will have prime responsibility to Promotion Humaine:

(1) for supervising the initial baseline sociological survey and the periodic subsequent evaluations for this and other Promotion Humaine programs, to assure that they are designed and executed in a sound manner, and to assure further that their findings are utilized for the purposes of technician training, and, where necessary, for project modification;

(2) for forming recommendations to Promotion Humaine concerning staff training and development, with particular reference to the present project and to those Promotion Humaine activities in future which will be designed to complement and reinforce the actions of the GOS technical agencies dealing with rural development; and

(3) for assisting the Director of Promotion Humaine in the analysis and evaluation of experience in Senegal and in other countries relevant to the development of a more effective, coherent, functional system of rural education in Senegal.

To carry these demanding responsibilities, the U.S. advisor must possess the following qualifications:

- (1) Complete fluency in the French language;
- (2) Professional qualifications in sociology/anthropology;
- (3) Working background in formal and non-formal education, particularly in francophone areas;
- (4) At least two years professional experience in West Africa.

b. Other Personnel

AID will support the costs of the resident Senegalese sociologist for his services under the project. The sociologist will provide:

(1) a baseline survey of prevailing attitudes and practices among the population inhabiting the project area, particularly, but also among people in selected villages outside but adjacent to the project perimeter. The sociological survey is to be prepared in cooperation with the U.S. advisor to Promotion Humaine, the Senegalese Project Director, and the AID Project Manager so that the survey will yield information which may be used in preparations for the project (particularly the training of project staff), and which may be systematically checked at regular intervals through to the conclusion of the project.

Time for baseline survey plus participation in training activities prior to commencement of project (3 months).

(2) Consultancy status at short notice throughout the life of the project (1 month);

(3) Three annual evaluations of the change in attitudes and practices taking place within, and adjacent to, the project area, as measured against data yielded by the baseline survey. These evaluations

shall contain recommendations for ways in which the project may be made more effective. A field evaluation will terminate the first three years of the project activity (4 months),

Item: 1 Resident Sociologist (8 months, total).\$15,000

c. Training

One Senegalese (The Chief of the Promotion Humaine team in the Toulékédi zone) will receive four weeks observation/study training in the United States in conjunction with similar training provided to the Senegalese range/livestock technicians (see C.I.D. Report). This joint training will ensure in so far as possible that the Promotion Humaine Chief shares the same conception of the technical objectives of the project as do the Senegalese technicians whom it will be his job to support. His prior academic and practical training as part of the Livestock Service, and as a teacher in a Rural Professional Training center, will further ensure this result.

The other members of the Promotion Humaine team assigned to the project zone will receive three months of pre-project training within Senegal. This training will be provided by a series of institutions: principally, by the Ecole Nationale des Cadres Ruraux, at Bamboey, in livestock, Agronomy and water and forests; by the Ecole Nationale d'Economie Appliquée in Dakar, in cooperatives and other forms of organization; and by the Institut de Technologie Alimentaire, in nutrition practices and the preparation of local foods. The purpose of this training is to

further familiarize the Promotion Humaine staff with the basic concepts of range and livestock management, cooperative organization, fire-fighting, and the like, to ensure their full comprehension of the technical objectives of the project.

Item: 1 observation/study tour, USA (4 weeks)	\$12,000
8 in-country training (3 months)	\$10,000

d. On-site training of project population.

Over the past 15 years, the service of Animation Rurale, with the participation of the technical services has developed a series of sessions of varying lengths and degrees of specificity, designed to interest, inform and educate rural people in improving their conditions of living using the means available to them. Each type of session has its own name and purpose. The session villageoise is designed to start up the dialogue between local and project technicians. The stage de premier degré is designed for 20 male and female representatives at a time, lasting up to ten days. These men and women are chosen by their home communities to discuss fully with the project staff the problems they face and possible solutions to those problems. These representatives then become the chief links between their communities and the project staff. The stage de deuxième degré lasts 3 days for 20 representatives at a time and has a technical, extension content. These sessions will be called by the project technicians, as supported by Promotion Humaine. The stage des structures de participation populaires, is designed to offer training for the leaders and members of the cooperatives, the councils, and the herder organizations which will form in the project zone. These sessions are again of a three day duration, for 20 persons. Sessions which are primarily of a training nature will be carried out in conjunction with the project technicians, particularly the Extension Specialist. This individual will rely on Promotion Humaine to organize and manage those sessions especially which require overnight food and lodgings. To this end, a simple shelter facility for forty persons is included within the construction element of this budget.

Special women's training will be conducted under the project by the animatrice and the two monitrices, working from their base at Baniou in subjects of highest interest and of greatest need throughout the project and adjacent areas. Their instruction will include special attention to the making of milk products: their conservation, use and sales. This is traditionally women's work in the project area. Milk handling will be a topic of particular concern to the success of the project. The monitrices will be supplied under the project with demonstration and teaching materials in a range of other fields, as well (gardening, hygiene, etc.). The maisons familiales will offer similar training, using different methods, which will tend to support and reinforce the work of the monitrices.

An especially important element of the on-site training program is literacy. Although literacy sessions will be open to all, emphasis will be given to training heads of households and their wives, all members of the maisons familiales, and members and officials of local cooperatives and councils. According to standard practice, Promotion Humaine literacy officers from a central locale (Dakar or Tambacounda) will train selected literate local persons (a total of seven for this project) in literacy teaching techniques. These instructeurs formateurs will also be provided with materials in the local language (Poular) concerning subjects of local, practical interest. Each instructeur formateur will lead classes in his or her village and nearby villages. The first cycle of literacy classes is designed to run for a total of 220 hours over a half-year period with two hour sessions three or four times a week. The second, less intensive literacy cycle (250 hours over 10 months) concentrates more on technical subjects (livestock, crops), and includes technical demonstrations. The instructeurs formateurs will receive up-grading and refresher training once a year, and their work will be evaluated. The instructeurs formateurs are provided with a small wage and a mobylette, which they pay for installments out of their wage.

On-site training (Animation, Technical, Literacy)

	FY 1977	FY 1978	FY 1979	FY 1980	Total
Village Training Sessions (no special cost)	-	-	-	-	-
First degree Courses (participant Support)	\$500	\$2,000	\$2,000	\$1,000	\$5,500
Second Degree Courses (participant support)	500	4,500	4,500	4,500	14,000
Participant Group Training (participant support)*	500	4,500	4,500	4,500	14,000
Literacy Training (Wages, materials)	500	1,000	1,000	1,000	3,500
Women's Training Program (Training materials)	3,000	-	-	-	<u>3,000</u> \$ 40,000

*

(Note: This item includes the whole range of special courses and programs designed for the preparation and consolidation of group activities in the project zones. Promotion Humaine distinguishes between those sessions according to their frequency, size, duration, and purpose, and each has its own designation: "seminars for intermediaries", "field training workshops", "leadership training", and "special training sessions". A detailed breakdown along these lines was not considered necessary in the present context.)

Item: On-Site Training Program (3 years) \$40,000

e. Inducement allowance

Whereas the GOS will cover all regular salary costs for Senegalese personnel associated with the project (with the exception of the sociologist), AID will cover the cost of inducement supplements to Promotion Humaine personnel at a rate commensurate with the same allowance received by the Senegalese livestock technicians assigned to the area (roughly 50%).

Item: Inducement Allowances (3 years) \$41,000

f. Construction, Furnishings, and Related Costs

To permit the concentration of Promotion Humaine activities in the project zone and adjacent areas, certain minimum facilities will have to be constructed: dwellings for the principal members of staff, a simple office, a storehouse, a structure for necessary provisions, a shelter for 40 persons for use in all project training sessions of two or more days' duration, and the two maisons familiales (at Toulékédi and, after two years, at Oursoulé in the second project zone). Plain furnishings and equipment will be supplied. The size of the houses are planned on a scale consistent with the dwellings planned for the project technicians.

<u>Houses</u>	<u>Cost</u>
Responsible	\$15,000
Animateur	10,000
Animatrice	10,000
Monitrices (2 houses)	20,000
Drivers (1 house)	<u>10,000</u>
	\$65,000
<u>Zone Headquarters (Baniou)</u>	
Office	\$12,000
Storehouse	5,000
Dormitory (40 persons)	20,000
Toilet Block	<u>5,000</u>
	\$42,000
Furnishing and equipment for houses and Headquarters	\$30,000
Maisons Familiales (2), with teaching materials	\$60,000

Item: Construction and related costs \$197,000

g. Vehicles

Staff mobility is essential to maximum staff utility throughout the project zone and in areas around the zone perimeter. A.I.D. will provide one long wheel base Landrover for the hauling of people and training materials, and two Volkswagons (four-wheel drive) for the activities of Promotion Humaine project personnel. To ensure the close support of Promotion Humaine's departmental headquarters at Bakel and of regional headquarters at Tambacounda, one four wheel drive Volkswagon of the same type will be provided to each of these offices.

Two mobylettes (reinforced, cross country) will be provided for each of the maisons familiales. Gasoline, lubricants and other maintenance costs of these vehicles will be covered to ensure their maximum utility over the life of the project.

Landrover (90 series III)	\$ 8,250
Volkswagon (181), four (4)	20,000
Mobylette (4)	2,000
Operation and maintenance	27,225
(30% of new value) X 3 years	<u>\$57,475</u>

C. Timing

The Promotion Humaine element of the livestock project is designed to support and complement the project's technical aspects. The timing of Promotion Humaine activities therefore depends to a critical degree upon the commencement of construction and extension work, and the rapidity with which equipment can be delivered on site and technicians can be recruited and trained. The following reflects the best approximation of the timing of

Promotion Humaine actions which could be made as of August, 1975. This timetable is based on the further assumption that the Promotion Humaine add-on can be approved in AID/Washington, and a Project Agreement concluded with the GOS by September 5, 1975.

1. The Technical Advisor (U.S.) to Promotion Humaine arrived in Dakar on short-term contract in June, 1975. He participated as an acting member of the C.I.D. design team. Commencement of this two-year contract: September 9, 1975.

2. The Sociological Study, requiring two months, will be carried out well in advance of the in-country training phase for project technicians and Promotion Humaine project staff. Given the role, on the one hand, of the U.S. advisor, who will begin his work in September 1975 in assisting with the selection and orientation of the sociologist, and with the design of his study; and given, on the other hand, the commencement of staff training in January, 1977, the sociological study is scheduled to fall at an optimum period in the calendar year 1976, depending chiefly upon the seasonal accessibility of the Toulókédi zone and the prior professional commitments (teaching, etc.) of the individual who is ultimately selected as sociological consultant to the project. It is tentatively recommended that the study be performed in April-May, 1976, in conjunction with the first visit to the project by some or all of the Promotion Humaine project staff. This would ensure that the study is completed prior to the season when roads are impassable, sometimes, in that region, into the month of October. Training is due to begin in January (next section).

3. Training

a. Observation/Study in U.S. The Chief of the Promotion Humaine field staff attached to the project will receive four weeks of observation/study in the United States. His program will be designed to coincide with the most appropriate portions of the U.S. program recommended for his technical colleagues. Although the precise recommendations of the C.I.D. team in this regard were not yet known, the most likely time of this visit was considered to fall in the period May-September 1976.

b. In-Country Staff Training

The three month period of training in the fundamental technical aspects of the project, including a detailed study of the project zone and the proposals of the project design, is planned to occupy the Promotion Humaine staff in the period January-March, 1977. The sociological consultant will participate in this training, as well as in the preparation of the Senegalese and American project technicians. The purpose of this training is to ensure, to the maximum extent possible, a common understanding of project ends and means among all participating staff members.

c. Animation/Technical/Literacy Training

Pre-project orientation sessions with the local population are due to begin in April, 1977. Full training will begin at the time of project construction, in July, 1977, and will continue to the termination of the project.

4. Construction

Although it is the judgement of the C.I.D. design team that major construction activities cannot begin in the Toulékédi zone prior to the arrival of the bulldozers on site (June 1977), Promotion Humaine will arrange for the construction of staff housing in Baniou, beginning in January 1977, or as may be required to allow preliminary Promotion Humaine activities (village sessions) to begin in the Toulékédi zone at the termination of staff training (from April 1977). Several months of preparatory work by Promotion Humaine is desirable prior to the time when pond and firebreak construction is scheduled to start. The Promotion Humaine zone headquarters at Baniou (office, dormitory, etc.) and the maison familiale at Toulékédi will be constructed in the period July-December, 1977. The maison familiale

planned for the Sarré zone, at Oursoule, will be constructed a year later, September-December, 1978.

5. Vehicles

The Promotion Humaine project Landrover will be ordered at the same time as the heavy equipment, in January, 1976, to ensure delivery to Dakar and out of customs by March, 1977. Two of the project Volkswagens will be ordered in January, 1976, for delivery in time to carry out the sociological investigation in April-May, 1976. The other two Volkswagens and the molybdenes, requiring a much shorter lead time, will be ordered in September, 1976 for delivery in March, 1977.

SUMMARY: Implementation Schedule for Promotion Humaine Component

AID/W approval of P.H. Component	August 29, 1975
Project Agreement Amendment signed with GOS	September 5, 1975
Contract signed with U.S. Advisor to P.H.	September 8, 1975
Project Landrover and two Volkswagens ordered	January, 1976
Two Volkswagens delivered, sociological investigation	April-May, 1976
P.H. Project Chief in U.S. for Observation/Study	July, 1976
Two remaining Volkswagens ordered	September, 1976
Construction of P.H. Housing (Baniou)	January-April, 1977
In-Country Training of P.H. Staff	January-March, 1977
Delivery P.H. Vehicles to project site, Bakel, Tambacounda; commencement of P.H. pre-project activities	April, 1977
Construction of Baniou Center and Toulékédi maison familiale	July-December, 1977
Commencement of P.H. Project Training Activities	July, 1977
Annual Sociological Evaluation	December, 1977
Construction of Maison Familiale (Oursoule)	September-December, 1978

Annual Sociological Evaluation	December, 1978
Annual Sociological Evaluation	December, 1979
Conclusion of first three years of P.H. activities in Project zone	August, 1980
Sociological Evaluation (First three years)	December, 1980

IV. Major Beneficiaries of Project

The major beneficiaries of the Promotion Humaine component to the present project include all those primarily affected by the technical elements: the predominantly poor, sedentary, conservative cattle owning families of this comparatively remote and isolated area. The technical elements of the project may affect the adult male portion of the population most directly. While supporting the technical elements of the program in the various ways described above, the Promotion Humaine component also touches directly the youth and the female portions of the population through portions of the Maison Familiale program and through the Women's Action program.

The Promotion Humaine component of the project also touches the population adjacent to, but outside, the project zone perimeter. This is done intentionally to win the understanding and support of populations whose good will is required if project grazing boundaries are to be respected, if fire prohibitions are to be honored, and if the family and organizational ties which exist between peoples inside and outside the project zone are to be maintained and strengthened. Contacts with populations outside the zone are also important if the new practices which the project seeks to introduce are to be adopted throughout a wider area.

V. Other Donor Activity

The approved PROP makes reference (p.78) to an extensive livestock project planned for one million hectares in the Tambacounda/Bakel area of Eastern Senegal, not including the AID project area. The IBRD is examining the merits of such a project and may make a credit available in FY 1977. The Bank project would also seek to introduce water resources, veterinary services, fire control, and managed grazing to obtain results similar to those sought in the AID project. RDO/Dakar has recommended that AID should consider contributing to the wider project (Project Identification Document, submitted June, 1975).

Promotion Humaine has submitted a request for IBRD financial support in the context of this activity (July 1975). The request, totalling \$400,000 lays heavy emphasis on literacy training and materials development in the four languages commonly spoken in Senegal Oriental (Poular, Soninké, Mandingue and Ouolof). The Promotion Humaine request also emphasizes the careful training of a 20 member regional team for Promotion Humaine in Senegal Oriental. In these ways, should the Promotion Humaine request be favorably received, the IBRD project would complement nicely the component discussed in this paper. The IBRD is already funding a program to develop, on a carefully controlled basis, the development of Promotion Humaine's Middle-Level Practical Training Program (EMP).

Promotion Humaine has made two further requests for support in this geographic area: one request to the French Fonds d'Aide et de Coopération for two maisons familiales; and one request to the EEC aid agency (FED) for the addition of a herder element to the farmer-artisan training center at Tambacounda. These proposed activities promise to be complementary, and

in no way contradictory, to the activity in the project zone of the Bakel department, described in the present paper.

VI. Further Studies Required

The one further study required prior to the commencement of the program described in this paper is the sociological survey, noted frequently in the preceding pages.

G.P.O.I. (Goal, Purpose, Outputs, Inputs) for Promotion Humaine Component.

The Promotion Humaine addition to the Senegal Range and Livestock Development project is designed (a) to reinforce the goal and purposes of the overall project, as stated in the approved PROP, at the same time as it is designed (b) to bring about changed attitudes and practices affecting nutrition, hygiene, and other conditions of living among those families participating in the general project.

The following matrix, therefore, should be considered as an addition to the logical framework presented in the PROP, while supporting all that is there stated in every particular.

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Program or sector goal	Objectively verifiable indicators	Means of verification	Important assumptions
<p>To help to ensure that present and increased income, and other available means of support, are used to the optimum by predominantly livestock raising peoples to improve their conditions of living.</p>	<p>Better hygienic conditions and improved nutritional standards among predominantly livestock raising people.</p>	<p>a) Health records for rangelands areas. b) trained observation</p>	<p>No domestic changes owing to climate, pestilences, or other causes beyond the control of livestock-raising people. GOS will provide personnel to introduce new concepts and practices. There are no inherent cultural reasons for the rejection of improved practices.</p>
<p><u>Project Purpose</u> To assure that the people involved in the project are prepared both to manage and maintain the improved system, as well as to use the increased revenues derived from that system to improve their conditions of living.</p>	<p>1. Organization at various levels within the project area to regulate the purchase of supplies, the distribution of animals and the sale of animals in a manner consistent with the preservation and improvement of forage and water resources; 2. Improved hygienic conditions, nutrition, and literacy and decreased incidence of disease. 3. Greater quantity and variety of farm and household objects in use which are self-produced.</p>	<p>1. Number, size and/or influence of producer-consumer organizations in project area, and real jurisdiction of other regulating bodies representative of the people of the area. 2. Health records 3. Trained observation (household surveys) 4. Local markets 5. Literacy records.</p>	<p>1. That opportunity exists for profitable sale of livestock raised using improved methods of management. 2. That increased income will occur, or at least, that a decrease in income will not occur, using these new methods. 3. That minimum health supplies and handcraft materials are available for use as attitudes change.</p>

LOGICAL FRAMEWORK (cont.)

Projects outputs

- . Sociological survey of local attitudes and practices, capable of being updated at regular intervals to measure general acceptance of non-acceptance of project-related concepts and to suggest improvements in project orientation.
- . General orientation of local people in support of changed practices introduced by project; particular understanding and support of new practice by their representatives.
- . Existence of local cooperative, herder's council, zone organizations to manage system (e.g. sales, grazing, fire control) introduced under the project.
- . Prevalence of functional literacy among responsible adult population.
- . Improved understanding of factors affecting family health, nutrition, and home improvement.

Objectively verifiable indicators

- An initial baseline data survey, interpreted for the benefit of project planning and staff training, with annual evaluations of change occurring (or not) among the population of the project area.
- General acceptance of project goals, methods, and results
- Improved practice.
- New or revitalized organizations which serve the end of commercialized, improved livestock, off-take, and the constructive use of improved revenues for improved protection and higher living standards.
- Better comprehension of commercial systems, technical improvements.

Means of verification

1. Survey manuscript and annual updating
2. Attendance of author of survey at training and project planning meetings, as required
 1. Evaluation data (annual)
 2. Members and resources of organizations, attendance records, financial accounts.
3. Observation of system as locally managed and applied
 - Literacy class attendance.
 - Increased use of written materials
 - Evaluation
 - Trained observation

Important assumptions

1. Existence of competent sociologist, able and willing to undertake surveys.
 2. Proper design of survey in terms of project needs.
 3. Effective execution of surveys
- Normal level of GOS support for such organizations
Adequate numbers of people able to maintain project systems without outside assistance.

LOGICAL FRAMEWORK (cont.)

<u>Project inputs</u>	<u>Objectively verifiable indicators</u>	<u>Means of verification</u>	<u>Important assumptions</u>
<p>U.S. inputs</p> <ul style="list-style-type: none"> - special advisor to Promotion Humaine - Salary and expenses of part-time sociologist, resident in Senegal (evaluation + sociological factors) - Commodities vehicle furnishing training materials - Training U.S. local - Construction houses training center maisons familiales (2) - Incentive payments for local staff 	<p>See Section III</p> <p>(staffing, costs and training)</p>	<p>Budget support</p> <p>Observation and evaluation</p>	<p>Recruitment of appropriate individuals to carry out assignments</p> <p>Equipment to be provided will arrive on schedule</p> <p>Existence of local training facilities at time required</p> <p>Engagement of building contractor at time required</p> <p>Continued GOS support for project.</p>
<p>Senegalese inputs</p> <ul style="list-style-type: none"> - staff salaries 			

BAKEL

Technical Assistance: U.S. Advisor (2 yrs) (Charged to Cereal Production Project)

Evaluation

1 Resident Sociologist (8 months total) 15,000

Training

P.H. Team Chief (4 wks, U.S.A.)	\$12,000	
4 Animation Personnel (3 months, Senegal)	5,000	
4 Maison Familiale (3 months, Senegal)	<u>5,000</u>	22,000

On-Site Training Local Costs (3 yrs) 40,000

Personnel (Incentive Payments) (3 yrs) 41,000

Construction & furnishing, Teaching materials, etc.

Houses

1 P.H. Team Chief	\$15,000	
1 Animateur	10,000	
1 Animatrice	10,000	
2 Monitrices	20,000	
1 Chauffeurs (2 drivers)	<u>10,000</u>	65,000

Zone H.Q.

1 Office (Baniou)	\$12,000	
1 Storehouse	5,000	
1 Dormitory, 40 persons (Baniou)	20,000	
1 Toilet Block (Baniou)	<u>5,000</u>	42,000

Furnishing & Equipment (all above) 30,000

1. Maison Familiale (equipped), Toulékédi 30,000

1. Maison Familiale (equipped), Oursoule (Sarró zone) 30,000

Vehicles

1. Landrover (long base, series III)	\$ 8,250	
2. VW (181), Project	10,000	
2. VW (18L) Bakel and Tambacounda	10,000	
4. Mobylettes (Maisons Familiales)	<u>2,000</u>	30,250

Vehicle Operation and Maintenance

(30% value, new) X 3 years 27,225

TOTAL 372,475

This environment appraisal refers to the region on the Senegalese side of the Senegal river between the villages of Balou and Gandé and inland away from the river to the edge of the flooded area. Three basic terrain types, with subdivisions, are recognized:-

(a) Falo - essentially the river bank

(b) Fondé - a levee dating from an earlier period c. 5500 B.P. during

which sea level was higher and conditions of deposition were

different. This levee now stands above the highest flood

levels and forms the site of all river-side villages

(c) Oualo - the land area away from the river behind the Fondé, formed

into a series of depressions receiving flood water and sediment.

Within these major terrain forms, particularly the last two, sub-types can be identified and it is these sub-types that are of immediate relevance to the CIDR programme.

The geomorphological relationships between these terrain types is reflected in soil properties, soil-moisture states and vegetation. All three are depositional features formed as a result of changing sea levels during the Holocene period, and seasonal and long term changes in the Senegal river regime; secondly the sediments are generally well-sorted and homogenous and characterised according to the elevation and form of the depositional features themselves. Since the maximum transgression of the Nouakchotian sea (5500 B.P.) the subsequent lowering of the base level has produced the major land forms noted above. Detailed knowledge of the Fondé and Oualo areas is a requirement for an environmental appraisal of the CIDR programme.

FONDÉ

(2)

The Fondé is restricted in area by comparison to the Oualo. Although a depositional feature of the Post-Nouakchottian the present-day regime of the river never produces a flood to cover this land form. All major villages are situated on the Fondé as is the major road access to Bakel. The Fondé is periodically broken by deeply-incised streams (marigots) which drain the Oualo land further away from the river.

The soil of the Fondé is generally a clayey sand to a sand type, young, and poorly developed. Where less well-drained, hydromorphic soils show evidence of white-grey and ochre-red mottling, and dark ferro-magnesium concretions.

The feature of these soils with immediate relevance to agriculture is the content of silt. Figures are not yet available from the War on Want Survey, but Audry's (1961) work indicates silt contents are high as 30% and coarse sand less than 10%. General chemical properties are indicated in table 1.

Table 1 (after Audry, 1961)

	<u>clayey-sand</u>	<u>sand</u>
CEC*	10-25	5-8
saturation %	50-90	35-100
Ca*	5-10	2.5-5.0
Mg*	2.5-6	1.5-2.5
K*	0.1-1.0	0.1-0.6
Na*	<0.25	<0.15
pH, 1:5H ₂ O	6.0	6.5
available phosphate, p.p.m. % of total P	0.04 - 0.08	
organic matter %	1.0-1.2	0.5-1.0
C/N		6 - 12

* meq/100 gs a. d. s.

Because of their sandy nature these soils tend to be porous although clay content may increase with depth. The level of the water table may be close enough to the surface to support deep-rooted plants while flood levels in the nearby Oualo are high, but in general, agricultural crops exist on rain fall alone, and without irrigation, dry-season cultivation is not possible. The high silt content tends to make these soils hard and difficult to cultivate.

The vegetation supported by the Fonde is composed of varying proportions of the following principal species:

Balanites aegyptiaca, Zizyphus species, Acacia seyal, A albida, A sieberiana, Guiera senegalensis, Piliostigma reticulata, and Bauhinia rufescens. Exact relationships of these species have not yet been determined. The density and overall size of these plants would seem to reflect intensity of human pressure rather than local variations in physiographic phenomena, although concentrations of Guiera senegalensis may reflect sandier soil conditions. As a general rule, the Fonde vegetation is more or less degraded, particularly close to villages. The intensity of farming activity is constrained by distance and no obvious fallow regime is observable, though this must exist in some form. The net outcome is a pattern of well developed bush around the mid-point between villages as between Mouderi and Diawara, and north of Mouderi. South of Bakel, the Fonde is more heavily utilised, particularly as it merges with the Falo. This is most evident between Koungani and Golmi and between Golmi and Yafera. Air photo evidence from 1960 clearly indicates greater utilisation of the Fonde since that time, particularly north of Bakel.

OUALO

Because of their topography and subsequent sediment enrichment through annual flooding, the Oualo lands offer the best soils for agriculture. Both their chemical and water-retentive properties make these lands the most productive and valuable in the Soninke agricultural system. These depressions, which vary both in areal extent and depth, receive annual flood water containing large quantities of suspended solids. The flood arrives in July and retreats at the end of September. The duration of inundation depends on topography; the lands merging with the higher Fondé on the river side and the Dieri on the interior side being reached only by the higher floods and then only for a short period. By contrast deeper depressions may retain water as permanent lakes long after the main flood has retreated. The short time in which the marigots have had to develop (5000 years or less) has resulted in an as yet inefficient drainage system which ensures the existence of the permanent lakes.

Soil conditions vary according to topographic position. A gradient exists between the silty Fondé soils and the strongly gleyed clay-rich soils of the lowest Oualo lands around the margins of the lakes, e.g. in the centre of the large basin west of Mouderi. A sequence of soils is found from strongly gleyed to vertisolic to the hydromorphic Fondé soils. Within the gradient variations exist. Thus on the lower, more recent levees which are found within the Oualo, pseudogleyed soils exist. In general the sequence from Fondé to Oualo is one of increasing clay content, decreasing silt, decreasing pH, increasing organic matter, and increasing K & Na. Within this gradient vertisols occur in higher level depressions

⑤

Table 2 Basic soil types of Senegal alluvial deposits (.after Audry, 1951)

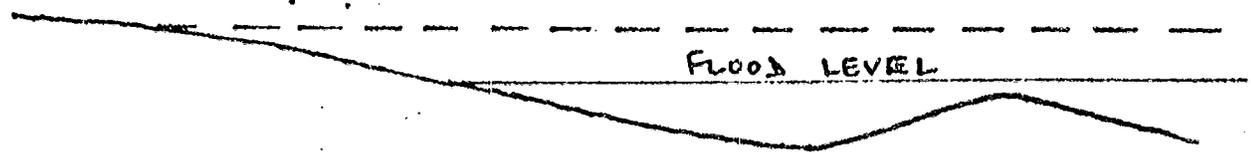
	Poorly Evolved Transported Hydromorphic	Vertisols	Gley	Pseudogley
	Low Fonde (Ouallere)	High Oualo (Hollalde)	Low Oualo	Petit Levees
clay		35-40	40-55	40-60
silt	20-25%	10-15	10-20	15-25
c. sand	<10%	very low	<2	
OM**	1.0-1.2	c. 1.0	0.5-2.5	1.0-1.6
pH	6.0-6.5	7.0+	<5.0	5.5-6.0
Na*	<0.25	<0.20	<0.50	<0.30
Ca*	5-10	15-20	6-8	6-9
Mg*	2.5-6.0	6-20	1-10	>Ca
P ₂ O ₅ †	0.04-0.08	c. 0.05	0.075-0.100	c. 0.100
K*	0.1-1.0	0.3-0.5	<1.5	0.25-0.5
CEC*	10-25	20-30	20-25	20-25+
Sat'n %	50-90%	100%	70-90	60-90.

* meq/100 gms.

† phosphate as % of total P

** % by weight

topography



with high proportions of double-lattice clays and marked changes in soil moisture between the wet and dry seasons. Table 2 shows some soil properties of this sequence.

The vegetation of the Oualo is more distinctive. Around the margins of the permanent lakes with strongly reduced gley soils Mimosa asperata is found in dense thickets. Further away from the lake, or in Oualo lands which are completely drained after the flood retreat, the natural vegetation is of Acacia nilotica forest, backed by a zone of Mitragyna inermis. Little of this remains intact as most of the Oualo lands, particularly to the north of Bakel, have been cleared for flood-retreat agriculture. The smaller levees support vegetation similar to the Fondé. On the Dieri side of the Oualo, still in clay-rich soils (pseudogley) large stands of Acacia seyal dominate. Most of these are still intact, especially to the south of Bakel behind Golmi, Yafera and Balou. The road from Bakel to Koungani passed through such an Acacia seyal woodland, merging into the Mitragyna inermis-Acacia nilotica-Mimosa asperata zonation close to Koungani.

CIDR irrigation project

Of particular importance to the CIDR programme are the intermediate lands between the high Fondé and the lower Oualo. These areas include the low Fondé or Fondé Oualere and in certain circumstances the higher Oualo Hollalde (see table 2). Whilst the initial programme is one of irrigated vegetable gardens on the high Fondé, later extension will move to sites suitable for larger scale motor-pump irrigation on the low Fondé for rice.

Low Fondé sites are favoured for two reasons:-

- (1) They are generally close to the villages which stand on the high Fondé
- (2) Large areas are as yet uncultivated, especially south of Bakel. The reason for this would seem to be because of their topographic position. Whilst the soil type is closer to the silty soils of the higher Fondé which are cultivated as soon as the rainy season begins, they are also subject to short term inundation if the annual flood is high. Because the flood comes a month after the first rains, there exists a risk of inundation of crops planted at the start of the rains should the flood be high. This would effectively eliminate the type of wet season agriculture practised on the high Fondé. For the same reason (lack of flood reliability) these low Fondé sites are not suitable for the flood retreat agriculture of the Oualo.

In recent years, because of the drought, and subsequent poor floods, some low Fondé areas have been cultivated in the same way as the high Fondé. This is particularly evident around Mouderi and Tuabo.

Two points are of relevance to the CIDR programme; the suitability of the soils for irrigation, and their chemical properties.

(1) Irrigation potential

An ideal site for irrigated rice production would be nearly flat, with a clay-rich soils, and predictable flood levels. The sites under consideration, particularly north of Bakel, fail to meet these exacting criteria. Firstly the nature of the topography - soils - water gradient is such that a combination of these three factors is unlikely to coexist. Flat sites are almost invariably at the bottom of the Oualo lands and are either flooded for too long or already

(8)

cultivated. Clay-rich soils are unlikely to be found on the low Fondé slopes because they are above the level of long-period inundation and therefore do not receive large quantities of fine depositional material. Finally it has already been noted that these areas are the least predictable with respect to flood levels.

Despite these reservations rice cultivation may still be possible. Within the low Fondé areas, flatter sites do exist. For example between Yafera and Golmi, north of Balou, west of Tuabo, north west of Bakel and along the marigot north of Manael. A detailed survey of all possible sites has not been possible during this initial visit, but the indication is of a sufficiency providing social and economic criteria can be met (i. e. distance from villages, labour requirements etc.). Even if flat sites cannot be found, the possibility of low embankment construction to impound water may effectively bypass this apparent limitation.

However it does seem that high level clay-rich sites which are not already cultivated are unlikely to be freely available. If irrigation by motor-pump is viable, the higher porosity of the silt/sand-rich soils can be offset. Detailed sediment analysis of soils from low Fondé sites is as yet incomplete, but field observations suggest that although not dominant, the clay-fraction in these soils may be sufficient to optimise the efficacy of irrigation.

The third criterion, of predictable flood levels, is impossible to meet. The danger here is less from inadequate flooding (as this can be offset by irrigation) but from irregular high flooding which may over-inundate rice seedlings at critical times. By siting the fields towards the drier extreme

of the Fondé soils this danger can be minimised, though this will, of necessity, mean a shift towards the more porous silty soils of the high Fondé.

By careful site selection with the assistance of local knowledge, it is believed that a compromise can be found between these conflicting requirements.

Chemical properties

Table 3 shows the major features of a series of soils taken from sites ranging from dry Fondé to much lower and wetter Oualo edge. The Oualo edge soils show low pH, reasonable cation exchange capacity, variable organic carbon content (though generally fair by savanna-zone standards), medium to poor available phosphate levels (except for Soil 8) and low potassium. By contrast with other soils of the Sahel/Sudan zone they may be thought of as relatively productive. The drier soils of the low Fondé are less acidic with higher pH, similar though slightly lower cation exchange capacity and organic carbon, generally higher, though very variable available phosphate, and slightly better potassium.

Table 3 Means and standard deviations for chemical characteristics of

Oualo Hollalde and Fondé Oualere soils

Soils	8, B2, K2, Y3, Y4 <u>low soils : Oualo margin</u>	15, 20, 4, 3, 35, K1, Y1 <u>higher level soils : low Fondé</u>
pH, 1:5H ₂ O	4.7 [†] 0.07	5.8 [†] 0.41
CEC+	16.44 [†] 1.78	13.57 [†] 4.13
C, %	1.79 [†] 1.03*	1.31 [†] 0.53
P, p.p.m	24.10 [†] 30.73	46.43 [†] 63.17**
K+	0.28 [†] 0.08	0.36 [†] 0.14

*two samples from currently cultivated land are below 1.00

**P levels show great variation

Further constraints:

(1) Sites so far examined have been close to the Fondé for reasons already specified. In addition it should be mentioned that the most readily available water supply for rice irrigation is from the river and this adds to the reasons for selecting a low Fonde site. Although irrigation from wells may prove adequate for collective gardens (as is envisaged at Gabou and Gounia) this would probably prove insufficient for the larger fields planned for rice cultivation. Alternative sources may be dammed marigots (though this would have much wider implications with respect to lake levels, fishing activity and flood retreat farming) or the lakes themselves.

(2) Land at the rear of the Oualo areas, now supporting Acacia seyal woodland on gleyed or pseudogleyed soils may provide suitable areas for rice after clearance (see table 4 for soil properties). However these are generally some distance from the Fondé villages and may therefore be too far to be adequately tilled. Water supply may also be difficult, although nearby lakes may contain a sufficient quantity, especially in view of the higher clay content of these soils.

(3) Profile pits were dug for sites B1, B2, K1, K2, Y1, Y2, Y3 and Y4. In most cases (B-Balou, K-Koungani and Y-Yafera), as the lower area close to the Oualo is reached, clay content increases, as do mottles and concretions. Water retention increases, especially below 50 cms. (examination in early April in the latter half of the dry season). A schematic view of these soils is shown in Fig. 1.

Figure 1

SOIL PROFILES FROM YAPERA, KOUNGANI AND BALOU

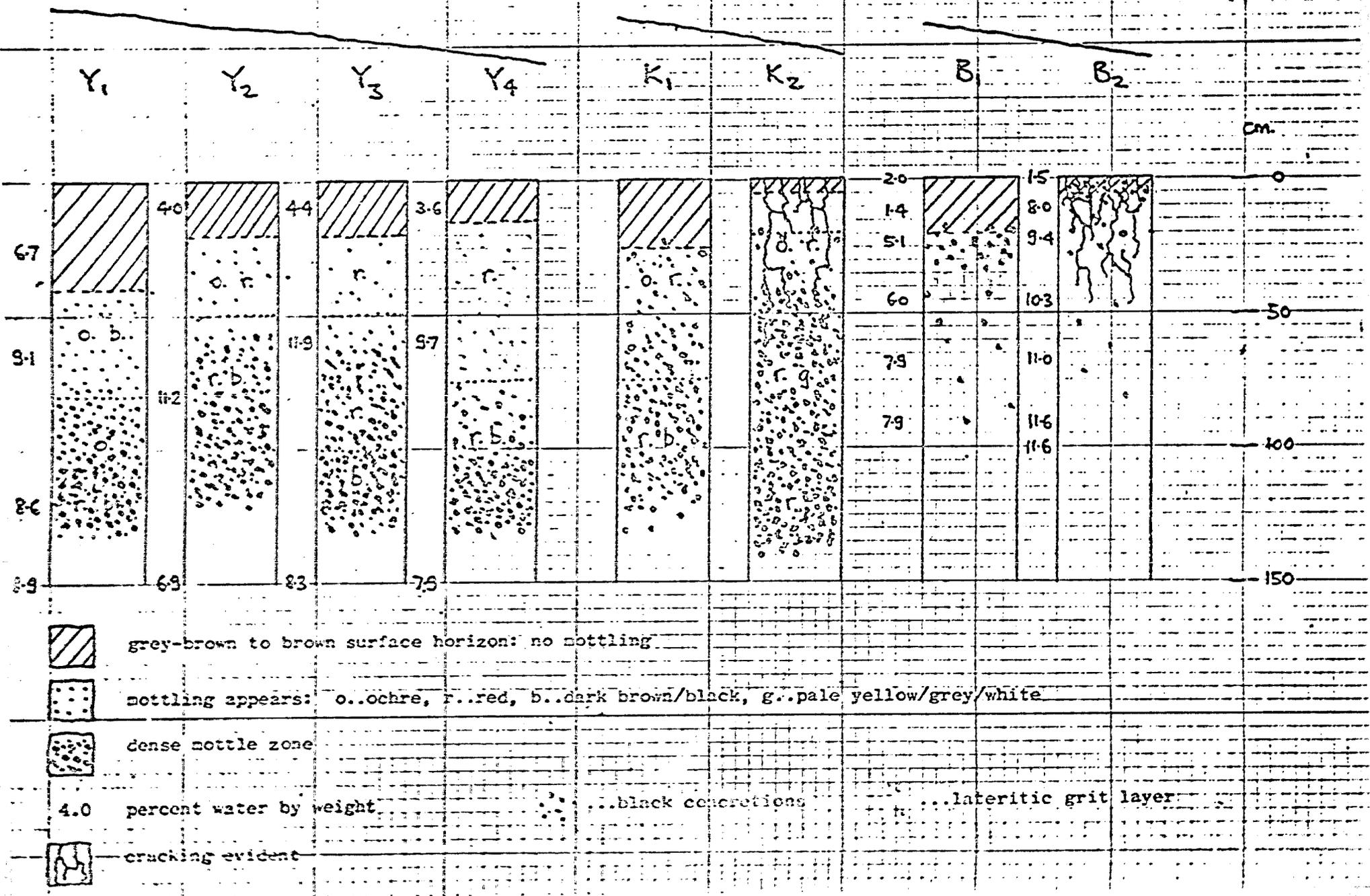


Table 4a

Soil characteristics of rear Oualo sites

	pH 1:5H ₂ O	CEC*	sat'n %	C %	N %	available				
						P p.p.m.	K*	Ca*	Mg*	Na*
(10) W. of Koun	5.5	9.2	72	2.12	0.15	13.6	0.3	5.0	1.2	0.1
(11) ditto drier	5.0	10.8	61	1.86	0.13	15.8	0.3	4.0	2.3	0.0
(17) W. of Golmi	6.3	28.0	100	1.16	0.11	12.2	0.8	16.8	10.8	0.2
(18) drier										
(19) drier	6.7	24.5	95	2.29	0.16	10.9	1.0	15.8	6.3	0.1

Table 4b

Soil characteristics of Marigot bank sites

(25)	6.6	15.00	100	1.23	0.08	8.1	0.4	9.6	5.3	0.0
(26) S. of										
(27)** Gounia	6.4	13.9	97	0.85	0.06	5.9	0.2	8.1	5.2	0.0
(28)										

* meq./100 gs. a.d.s.

**30 cm. rather than surface sample; hence low C and N values.

The increasing proximity of mottling to the soil surface as the lower sites are approached is to be expected and indicates reduction under water-logged conditions and locates these soils within the category 'SOLS PEU EVOLUES D'APPORT, HYDROMORPHES' (I.R.A.T., 1969). The Balou soils show some vertisolic development. Clay content does not increase progressively with depth, there being a concentration zone, below which clay content decreases. At Koungani the clay zone is near the surface (K1) or at 40 cms (K2); at Balou no apparent concentration (B1) or at 50 cms (B2). Further details of soil texture await completion of the analyses. Chemically, lower sites show high Na values at depth and these may present problems

requiring consultation with a soil chemist/agronomist. Table 5 shows some chemical properties of the profile soils.

Table 5 Sodium and conductivity levels of samples from 8 soil pits

		B1	B2	K1	K2	Y1	Y2	Y3	Y4
Na	1	1.4	0.4	0.0	0.2	0.4	0.3	0.2	0.2
meq/	2 depth	4.6	1.3	0.0	1.3	1.6	1.5	1.6	1.2
100 g.									
a. d. s.	3			0.0	1.5	2.1	1.1	1.4	1.1
Conductivity	1	0.13	0.14	0.06	0.06	0.03	0.06	0.05	0.07
mmhos	2 depth	0.78	0.05	0.03	0.06	0.09	0.12	0.09	0.07
1:5H ₂ O									
25°C	3			0.02	0.08	0.11	0.08	0.15	0.11

CONCLUSION

Physical constraints on the CIDR programme require careful selection of sites to optimise soil conditions whilst minimising flood difficulties. With irrigation, selection of less clay-rich soils is possible and flood problems can thus be minimised. The areas at present under consideration by the CIDR team encompass a range of soils from the low Fonde to the Oualo margins, and with local knowledge of flooding, optimisation is possible.

It may well be that non-physical constraints such as tenure, labour requirement, cultivation techniques and irrigation conditions will be more influential in determining exact locations for the programme.

14

Population of the Department of Bakel (1975-76)

<u>Arrondissements</u>	<u>Active Workers</u>	<u>Children</u>	<u>Handicapped and elderly</u>	<u>Total Population</u>
OLODOU	15,652	7,853	1,461	24,946
BELE	3,579	2,991	645	7,215
GOUDIRY	9,373	7,675	1,162	18,210
BALA	10,025	6,198	968	17,191
TOTAL	<u>38,629</u>	<u>24,697</u>	<u>4,236</u>	<u>67,562</u>

Source: Préfet de Bakel (Monsieur M'Baye Niang)

Adjoint du Préfet de Bakel (Monsieur Sekou Sonko)

Date: January 2, 1974.