

IRRIGATION MANAGEMENT IN WEST AFRICA

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Prospects and proposals for a
research and professional development program

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE
Digana Village via Kandy, Sri Lanka

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Summary : This report explores IIMI's prospects and possibilities of establishing linkages with organizations involved with managing irrigation systems in the West-African sub-region.

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IRRIGATION MANAGEMENT IN WEST AFRICA

Prospects and Proposals for a
Research and Professional Development Program

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE
Digana Village via Kandy, Sri Lanka

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IRRIGATION MANAGEMENT IN WEST AFRICA

Prospects and Proposals for a
Research and Professional Development Program

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PREFACE

Irrigation development is widely favored by policy makers in developing countries as a means of enhancing agricultural productivity, improving equity in access to water resources, sustaining environmental stability and improving the quality of life in rural areas. However, despite impressive gains in some countries, the actual benefits achieved during the past two decades have been disappointing. This has been attributed to deficiencies in irrigation management that arise from inadequate planning, inappropriate designs and especially from deficiencies in operation and maintenance.

Against this background the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR) recommended the establishment of an International Irrigation Management Institute (IIMI) to develop knowledge, principles and expertise for improving the management of irrigation systems. The ultimate objective is to enhance independent national capacity to improve and sustain irrigation performance.

The Institute, an autonomous, international non-profit organization, with Headquarters in Sri Lanka, became operational in June 1984. Since that time it has established cooperative linkages with a number of irrigation agencies and institutions in several Asian countries.

This report explores the prospects and possibilities of establishing similar linkages with irrigation institutions in the West-African sub-region. It is based on field visits to irrigation projects in five West-African countries: Burkina Faso, Mali, Mauritania, Niger and Senegal. Field visits were concluded with a synthesis meeting in Ouagadougou, Burkina Faso on 19-20 May 1987 with participation of national institutions and research organizations as well as regional organizations such as CIEH and EIER.

The purpose of the meeting was to present and discuss the findings of the field visits with the participants, and thereby ensure that recommendations made in this report would faithfully portray the needs and interests of the prospective partner institutions.

Possibilities for cooperative linkages are expressed in terms of project proposals. Proposals that are still subject to further negotiations and approval by all parties and Governments concerned, including IIMI's Board of Governors.

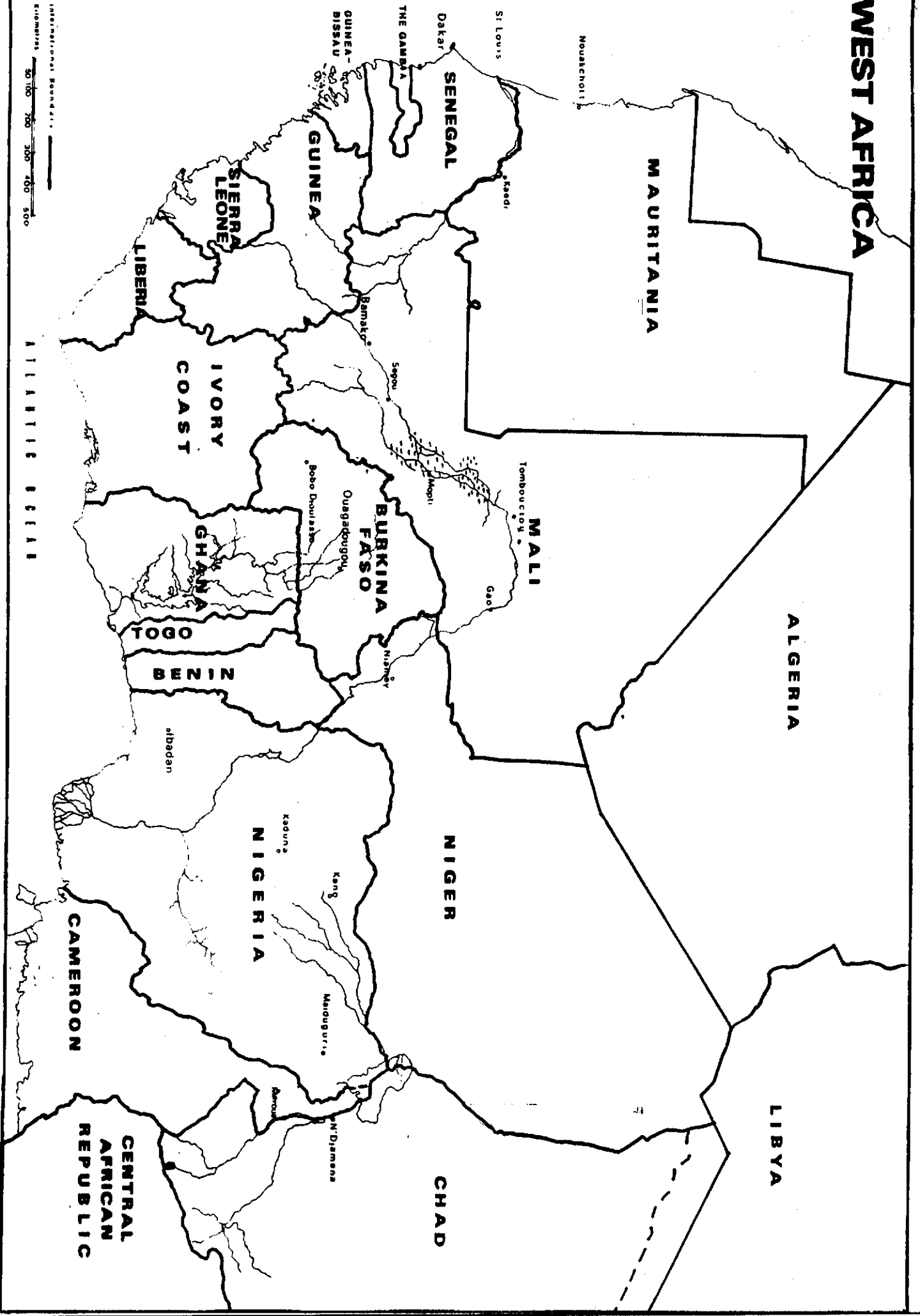
The proposals should not be considered as restrictive either, excluding the implementation of activities in other, non-visited countries of the region, English speaking countries in particular.

Ir. F. E. Schulze
Director, International Programs
Digana, July 1987.

ABBREVIATIONS

AMVA	Autorite pour la Mise en Valeur de la Vallee du Sourou
AUW.....	Agricultural University Wageningen
CIEH.....	Comite Inter-Etat d'Etudes Hydrauliques
CILSS.....	Comite Inter-Etat pour la lutte contre la Secheresse au Sahel
CNAPTI.....	Centre National d'Application et de Perfectionnement aux Techniques d'Irrigation
CIRAD.....	Centre de Cooperation Internationale en RechercheAgronomiquepourleDeveloppement
CGIAR.....	Consultative Group on International Agricultural Research
EIER.....	Ecole Inter-Etat d'Ingenieurs de l'Equipement Rural
FEER.....	Fonds d'Eau et d'Equipement Rural
INERA.....	Institut National d'Etude et Recherche Agronomique
ISRA.....	Institut Senegalais de la Recherche Agronomique
IRAT.....	Institut de Recherche Agronomique Tropical
IIMI.....	International Irrigation Management Institute
IDRC.....	International Development Research Centre
OMVS.....	Office de Mise en Valeur de la Vallee du Senegal
ONAHA.....	Office national des Amenagements Hydro-agricoles
SAED.....	Societe Nationale d'Amenagement et d'Exploitation des Terres du Delta du Fleuve Senegal, et des vallees du Fleuve Senegal et de la Faleme
SONADER.....	Societe Nationale Pour le Developpement Rural
TAC.....	Technical Advisory Committee

WEST AFRICA



SYNTHESIS REPORT

IRRIGATION MANAGEMENT IN WEST AFRICA

**Prospects and Proposals for a
Research and Professional Development Program**

SYNTHESIS REPORT

SYNTHESIS REPORT

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SYNTHESIS REPORT

1. INTRODUCTION

During its June 1985 meeting the Board of Governors directed that a strategy paper be prepared for IIMI's operations in Africa. To compile the necessary information, IIMI sent exploratory missions to different African countries, which resulted in a document entitled "An African Strategy for IIMI", that was presented to the Board at its July 1986 meeting.

From the nine centers and regional groupings for IIMI operations proposed by the document, the Board selected three for further consideration : Sudan (Wad Medani), Morocco (Rabat), and a regional approach for West-Africa. This document will exclusively deal with the latter.

During the months of April/May 1987 an IIMI mission visited several West African countries. The principal objective of the mission was to outline a conceptual framework and the content of the program activities which the Institute could undertake in collaboration with national and regional institutions concerned with irrigation management in the region. The mission was headed by Ir. F.E. Schulze, IIMI, Director, International Programs and consisted of Mr. D. Berthery, Ingenieur du Genie Rural, des Eaux et des Forets of IIMI, Mr. J.C. Legoupil, Chief of the Division "Gestion des Eaux pour l'Agriculture" of IRAT and IIMI Consultant and Prof. A.A. Kampfraath, Head of the Department of Management Studies of the AUW in the Netherlands (Consultant to IIMI for the period of 16 to 21 May 1987).

The mission visited five countries of the sub-region : Burkina Faso, Mali, Mauritania, Niger and Senegal. In each country the mission tried to identify specific operations that could constitute the content of a program of cooperation with national organizations, institutions or field managers concerned with problems and responsibilities in irrigation management. For each operation the mission defined priority areas for research and field studies, identified prospective national partners and explored their interests, estimated financial and other resources required and drew up an operational framework for program implementation.

The mission also explored possibilities of establishing cooperative links with regional organizations such as CILSS, CIEH and EIER. The prospects of establishing a cooperative training program in irrigation management with the EIER are explained in more detail in a later section. The mission also explored the possibilities of an association with the CIEH's ongoing communication and publication program.

The mission's field visits were concluded with a synthesis meeting in Ouagadougou on 19 and 20 May 1987, which was chaired by the Secretary General of the CIEH.

Key institutions identified by the mission as prospective partners in

implementing an irrigation management research and training program participated in the meeting. These included :

Burkina Faso	:	Ministere de l'Eau Ministere de la Question Paysanne INERA
Mali	:	Office du Niger
Niger	:	ONAHA INRAN
Senegal	:	SAED ISRA
Regional	:	CIEH EIER

The purpose of the meeting was to present and discuss the findings of the mission with the participants to ensure that recommendations to be made by the mission would faithfully portray the needs and interests of the prospective partner institutions.

Operations, conclusions and recommendations presented in the report are, however, the sole responsibility of the mission.

The present report elaborates further on the prospects and possibilities for future cooperation with national and regional organizations in the sub-region. Based on visits to the countries mentioned earlier, the mission identified the following opportunities :

1. Cooperation with EIER in the field of irrigation management training, through the development and organization of a special irrigation management course.
2. Cooperation with CIEH in the field of research, documentation and information exchange.
3. Cooperation with research and development organizations in Burkina Faso on the agricultural use of water resources with limited potential (groundwater, small dams).
4. Cooperation with research and development organizations in Niger on farmer managed irrigation systems in the Niger valley.
5. Cooperation with the Office du Niger in Mali on operational water management procedures and synthesis of existing experiences.
6. Cooperation with research and development organizations in Senegal and Mauritania on analysis of irrigation systems performance in the Senegal river valley with particular emphasis on the process of disengagement.

The operations identified for each country are proposed, and therefore not binding or limiting. It is suggested that the Research and Development Program be implemented as a research and development network. This will include selecting one central research theme per country, (based on a typical irrigation development model or strategy), and a mechanism to associate interested organizations from other countries with that particular part of the program.

The prospective opportunities outlined above are based only on the mission's visits to the five countries of the sub-region. Future missions to other parts of West Africa, could yield similar opportunities but are not discussed in this report.

The proposals should therefore not be considered as restrictive to the five countries visited. They are not meant to exclude IIMI's activities in non-visited countries of the sub-region, anglophone countries in particular.

Contacts and communications from IIMI's Headquarters in Sri Lanka with West-African countries, organizations and individuals have proved difficult in terms of continuity. Therefore, IIMI's Board of Governors during its June 1987 meeting authorized the appointment of a Resident Representative for a period of one year. He or she would be expected to follow up on the findings of the mission and to extend contacts to other countries in the sub-region interested in irrigation management issues and not contacted so far.

It is expected that this temporary representation will develop into a long-term one within the framework of a coherent program for the area. Ouagadougou in Burkina Faso would be the most strategic location for such a representation in view of the large number of regional organizations already present there.

2. CIEH AND EIER

The CIEH (Committee Inter-Africain d'Etudes Hydrauliques) was created in 1960. Its member countries are : Benin, Burkina Faso, Cameroun, Congo, Ivory Coast, Gabon, Mali, Niger, Senegal, Tchad and Togo. CIEH's main objective is to promote regional cooperation in relation to water resources development, through research studies and exchange and dissemination of information. Its program consists of : 1) general studies or studies on methodologies ; 2) technical assistance to Member States ; and 3) dissemination of information and field experiences. CIEH's staff consists of approximately 20 professionals of different, mainly technical disciplines. It maintains a documentation center (15,000 references), issues a trimestrial bulletin (1,000 copies), and operates an information network. It has carried out more than 200 studies of general interest to the Member States.

The CIEH is supported (technically and financially) by a number of donor countries and organizations. Every two years a Council of Ministers meet to define the Committee's program.

The EIER (Ecole Inter-Etats d'Ingenieurs de l'Equipement Rural) was created in 1968. Its member countries are the same as those of CIEH, but with the Central African Republic as an additional member. Three program areas are recognized :

1. la formation initiale : a three year training program (after two initial years of preparation in the participant's home country) leading to the degree of Ingenieur de l'Equipement Rural, with approximately 40 participants each year.
2. la formation post-universitaire : a one year specialization course with 10 participants each year.
3. la formation permanente : training courses of an average duration of 4 weeks (sometimes 10), to upgrade participants' knowledge in particular fields with a varying number of participants. On average six courses are held each year on different subjects.

In addition, the EIER maintains close links with a number of training institutions in French speaking Europe. There is also close cooperation with the CIEH, with whom the EIER shares the same compound.

3. CHARACTERISTICS AND TRENDS

Irrigation development in the West-African sub-region started, practically speaking, in the post-colonial period after 1960. This means that, in contrast to Asia, there is an absence of irrigation tradition and of irrigation bureaucracies as such (i.e. no Ministries of Irrigation). Instead, irrigation development is in general entrusted to para-statal organizations who, in addition to irrigation, assume many other functions related to agricultural production, upstream as well as downstream. These functions demand a great amount of attention from the organization.

Hydrologically, irrigation perimeters in West-Africa are small. There is only one large centrally managed system of about 40,000 ha (Office du Niger in Mali). A second category consists of systems with perimeters of 50-2500 ha (most common 300-500 ha) whose management is generally shared between some type of farmers organization and the earlier mentioned multi-functional para-statal organization. In Niger the management is generally in the hands of farmers' cooperatives who receive technical assistance from the Government. A third category consists of small, farmer-managed, village irrigation systems of less than 50 ha. Finally, there is what is called the agricultural use of water resources with limited potential, or irrigation around low-yielding tubewells and small earthen dams. Here the size of the "perimeter" is generally less than 5 ha.

Another important characteristic of irrigation development in West-Africa is that it is generally based on rice-based, pump-lift irrigation (except in the inner-delta of the Niger in Mali). This makes irrigation in West-Africa a costly affair. As investment costs are also extremely high,

irrigation development and subsequent operation and maintenance is a matter of constant financial and economic concern.

As in many other parts of the world there is a very clear and definite policy towards governments disengagement, not only in the irrigation sector, but also, and even more pronounced, in areas of input supply to the agricultural sector (services, credit, fertilizers) and the marketing of agricultural products -- functions that were assumed by the earlier mentioned para-statal development organizations. The role of these organizations in this changing policy environment would be (or is already) one of technical support to farmers organizations/cooperatives that have taken over (at least part) of the tasks originally entrusted to these organizations.

This is true particularly for the irrigation and services/extension sector which is more difficult to privatize than for instance marketing and input supply.

Closely associated with the policy of disengagement is the policy of real-cost invoicing. If joint management of irrigation systems is present, the organization rendering services to the farming community (for instance running the pumping station or maintaining the main canal) would be expected to find ways and means to charge the farmers for the real costs of those services.

In the Sahelian zone of West-Africa, irrigation will play an increasingly more important role for national political reasons, such as food self-sufficiency for agro-climatological reasons, the need to reduce vulnerability to the volatility of the Sahelian climate, or for socio-economic reasons, such as risk avoidance at the level of the individual household. The challenge is to create irrigation development models that are technically sound, socially acceptable, economically viable, and physically adaptable to the natural environment. Experience so far has shown that there are still many unknown factors that must be taken into consideration before answers to these questions can be found: unknowns that often trace back to the fundamental question of how to integrate modern irrigated agriculture with the more traditional non-irrigated agriculture/livestock production systems.

4. OBJECTIVES AND APPROACH

The objective of the IIMI West-African program falls within IIMI's overall mandate to contribute to the improvement of the performance of irrigation systems with particular emphasis on matters of irrigation management. As irrigation management is first of all a national responsibility, strengthening the national capabilities in irrigation management is an obvious way for IIMI to achieve its objectives.

Therefore IIMI's West-African program will be based on a close and formal cooperation with national organizations having a direct or indirect responsibility for the management of irrigation systems as well as research organizations involved in irrigation (management) research.

IIMI's West-African program not only should fit IIMI's mandate (irrigation management) and objectives (improvement of irrigation system performance), but should in particular serve the needs of the area. In this dual context there are two areas that are of particular interest :

1. The improvement of irrigation system performance by developing management procedures and techniques for operation and maintenance of irrigation systems that are appropriate and adapted to the specific local conditions (traditional management conditions and capabilities in particular).
2. The improvement of irrigation systems performance by defining irrigation development models (technically sound, economically viable and socially acceptable) that permit an optimum use of existing facilities. In this respect the size of the holding, the man-power requirements, the technological level of (farming) operations, and the integration of irrigated-and non-irrigated agriculture are important aspects.

As for IIMI's general program, its West-African program will have the same three program areas : research, professional development, and communication and information exchange.

5. RESEARCH PROGRAM

For its West-African research program IIMI has opted for a whole systems, multi-purpose, field "research cum development" approach, rather than a shopping list, or specific problem oriented approach. The reasons are that in the West-African sub-region, systems are in general relatively small and the multitude of problems are intimately interwoven. The main problem under these circumstances is to develop replicable solutions to the larger and more complex problem of irrigation development and not to provide an answer to specific technical or managerial problems in isolation. IIMI's Research and Development Program will therefore be based on a combination of physical and socio-economic characteristics of typical irrigation development models or strategies as encountered in the West-African sub-region.

The main steps to be considered in the implementation of a Research and Development program are :

1. Problem analysis by means of a comprehensive study of the local situation where intervention will take place, including physical, technical, social and economic aspects.
2. Screening and mobilization of information and experiences from elsewhere that are relevant to the problems identified.
3. Formulation of an action program to test the technical and managerial hypotheses defined on the basis of the above mentioned steps.

4. Implementation of the action program recognizing the need for its continuous adjustment and reformulation in consultation with the target group.
5. Developing a monitoring and evaluation program permitting action program adjustments and translation of results in view of their expansion to other areas.

Cooperation with national research institutions is a pre-requisite to carrying out a multi-purpose field research and development program. Through this process, multi-purpose field research also meets the objective of enhancing national capabilities.

Figure 1 tries to summarize the Research and Development program for the four earlier mentioned regions : Burkina Faso, the inner delta of the Niger in Mali, the Niger valley in Niger, and the Senegal river valley in Senegal/Mauritania. The diagram shows problem areas and research themes that are of common interest to all four situations and those that are of specific interest to each one of them.

Research themes of common interest include analysis of physical and technical factors and conditions, managerial and institutional factors as well as the analysis of external factors that affect irrigation system performance. These analyses are aimed at identifying measures of improvement in each one of these factors or conditions, individually as well as in the context of their mutual interdependencies.

Research themes of specific interest refer to specific problem areas associated with a particular type of irrigation development. This does not mean that these research themes would only have local significance. Their applicability clearly exceeds the boundaries of the country concerned. As mentioned before, it is suggested that the Research and Development program will be implemented as a research and development network, selecting one central research theme per country, (based on a typical irrigation development model or strategy), and a mechanism to associate interested organizations from other countries with that particular part of the program.

The components of the proposed Research and Development program for each of the four countries are given below.

Burkina Faso

In Burkina Faso emphasis will be placed on the agricultural use of water resources with low potential. Two different situations will be considered : water resources from small earthen dams and from groundwater (village wells).

Small earthen dams (about 600 in number) are mainly constructed for drinking water purposes.

Their use for irrigation purposes has been limited so far (2500 ha), while their potential has been estimated at 20,000 ha per dry season irrigation. One of the Government's present concerns is to create an

awareness among the rural population of the untapped possibilities.

Ground water resources include a large number of wells installed in fractured bedrock areas. They are very low discharge capacity wells that primarily serve drinking water purposes. In spite of severe limitations (considerable depth and low discharges) it is expected that these water resources could, in addition to meeting drinking water needs, irrigate 2-3 percent of the cultivated area and meet 15-20 percent of the food needs of the villages concerned. As for small dams, the major problem is to find the appropriate development models with the relevant technical and non-technical aspects.

Mali : "Office du Niger"

In relation to the other irrigation systems visited in the region, the "Office du Niger" is the oldest and largest gravity-based system. Since its origin in 1932, 57,000 ha have been developed ; of that amount 37,000 ha are actually farmed in semi-intensive paddy production mode (1.8 to 2.0 tons of paddy/ha harvested on average for a single crop per year).

In the Sahel region of West-Africa, which is periodically ravaged by drought, the "Office du Niger" controls an exceptional water and land territory of 1 M ha. Within the territory there is immense potential for diversified agricultural production, stock farming, fishing, and irrigation development in the inner delta of the Niger. Thus, the "Office du Niger" has the potential to contribute substantially in the medium term to resolve national and regional food deficits through production surpluses.

The "Office du Niger" is the object of an extensive rehabilitation program presently under negotiation with a group of donor countries and agencies. The main objectives of this program are : 1) the physical rehabilitation and modernization of most of the hydraulic infrastructure which has deteriorated, and the levelling of lands allocated to farmers ; and 2) the internal re-organization of the irrigation agency based on a new definition of its functions, with particular reference to farmer participation. The main functions of the "Office du Niger" would focus on management of services for land and water resources, as most of the other activities will be progressively transferred to farmers and other economic entities.

Given the present situation of the "Office du Niger," two areas would be of interest to IIMI : first, the prevalence of water management related problems of all kinds, technical and institutional, from the main canal down to farm level and the drainage system ; and second, the uncertainties which still remain about the choice of appropriate criteria for future rehabilitation programs and resultant difficulties in managing a heterogeneous system with different designs, operating rules, facilities, and conditions offered to farmers.

It is proposed to implement the program in close cooperation with the newly created division "Gestion de l'Eau" (water management) of the "Office du Niger" simultaneously enhancing its capacity.

FIG. 1 : TABLEAU SYNTHETIQUE DU PROGRAMME REGIONAL AFRIQUE DE L'OUEST (IIMI)

THEMES DE RECHERCHE I I M I		INTERET SPECIFIQUE		INTERET COMMUN		CARACTERISTIQUES DU PROJET		SPECIFICITE DE L'OPERATION		REPRESENTATIVITE REGIONALE DU PROJET	
PAYS PROJECT		BURKINA-FASO		NIGER (VALLEE DU FLEUVE)		MALI (OFFICE DU NIGER)		SENEGAL-MAURITANIE (VALLEE DU FLEUVE)		EXTENSION A D'AUTRES PAYS	
RESSOURCE EN EAU		FAIBLE POTENTIALITE SOUTERRAINE/PETITS BARRAGES		IMPORTANTE MAIS NON REGULARISEE PERIMETRES < 200 ha AVEC POMPAGE		GRAND PROJET GRAVITAIRE		DIVERS TYPES D'AMENAGT AVEC POMPAGE		-	
TYPE D'AMENAGEMENT		P.P.I.V. < 20 ha		GRAND PROJET GRAVITAIRE		DIVERS TYPES D'AMENAGT AVEC POMPAGE		DIVERS TYPES D'AMENAGT AVEC POMPAGE		-	
ORGANISATION GESTION		AUTOGESTION SPONTANEE		GESTION AVEC COOPERATIVE		GESTION ADMINISTRATIVE DESENGAGEMENT PARTIEL		GESTION MIXTE DESENGAGEMENT TOTAL		-	
SYSTEME DE CULT.		VIVRIER + DIVERS		DOUBLE RIZICULTURE (CIV.) - DIVERSIFICATION (TER.)		SIMPLE RIZICULTURE		DOUBLE RIZICULTURE (Delta) - DIVERSIFICATION (Vallée)		-	
PLUVIOMETRIE		500 - 600 mm		400 - 600 mm		400 mm		300 - 1300 mm		-	
- PROBLEMATIQUE NOUVELLE DE VALORISATION AGRICOLE DES RESSOURCES EN EAU MENTIONNEES		- EXPLARITE DU MODELE AUTOGENE		- LE MANAGEMENT DES GRANDS PERIMETRES GRAVITAIRES		- GRANDE DIVERSITE DE SITUATION		- VOLONTE DE DESENGAGEMENT DE L'ETAT		- POTENTIALITE IMPORTANTE	
* 20.000 ha DES PETITS BARRAGES		- 140 000 ha au NIGER		- 200 000 ha au MALI		- 400 000 ha (Vallée)		- CONDITIONS EXCEPTIONNELLES POUR DES ANALYSES COMPARATIVES		-	
* 2 - 31 DES SUPERFICIES IRRIGUES EAU SOUTERRAINE INTERET REGIONAL CONSIDERABLE		- INTERET POUR LE MODELE D'AUTOGESTION		- EXCEPTIONNELLE POTENTIALITE POUR LA REGION		- CONDITIONS EXCEPTIONNELLES POUR DES ANALYSES COMPARATIVES		-		-	
AMELIORATIONS DES PERFORMANCES DES SYSTEMES D'IRRIGATION		INDICATEURS : EFFICACITE, PRODUCTIVITE, EQUITE, PERENNITE, SANTE		INDICATEURS : EFFICACITE, PRODUCTIVITE, EQUITE, PERENNITE, SANTE		INDICATEURS : EFFICACITE, PRODUCTIVITE, EQUITE, PERENNITE, SANTE		INDICATEURS : EFFICACITE, PRODUCTIVITE, EQUITE, PERENNITE, SANTE		INDICATEURS : EFFICACITE, PRODUCTIVITE, EQUITE, PERENNITE, SANTE	
ANALYSES ET AMELIORATIONS		FACTEURS ET CONDITIONS PHYSIQUES ET TECHNIQUES		FACTEURS ET CONDITIONS PHYSIQUES ET TECHNIQUES		FACTEURS ET CONDITIONS PHYSIQUES ET TECHNIQUES		FACTEURS ET CONDITIONS PHYSIQUES ET TECHNIQUES		FACTEURS ET CONDITIONS PHYSIQUES ET TECHNIQUES	
ET		INDICATEURS : QUALITE DE L'INFRASTRUCTURE HYDRAULIQUE, CONDITIONS A LA PARCELLE (PLANAGE, TAILLE D'EXPLOITATION)		INDICATEURS : QUALITE DE L'INFRASTRUCTURE HYDRAULIQUE, CONDITIONS A LA PARCELLE (PLANAGE, TAILLE D'EXPLOITATION)		INDICATEURS : QUALITE DE L'INFRASTRUCTURE HYDRAULIQUE, CONDITIONS A LA PARCELLE (PLANAGE, TAILLE D'EXPLOITATION)		INDICATEURS : QUALITE DE L'INFRASTRUCTURE HYDRAULIQUE, CONDITIONS A LA PARCELLE (PLANAGE, TAILLE D'EXPLOITATION)		INDICATEURS : QUALITE DE L'INFRASTRUCTURE HYDRAULIQUE, CONDITIONS A LA PARCELLE (PLANAGE, TAILLE D'EXPLOITATION)	
CONCEPTION		INDICATEURS : PROCESSUS ET CONDITIONS DU MANAGEMENT (PERSONNEL, ORGANISATION, INFORMATION, OUTILS)		INDICATEURS : PROCESSUS ET CONDITIONS DU MANAGEMENT (PERSONNEL, ORGANISATION, INFORMATION, OUTILS)		INDICATEURS : PROCESSUS ET CONDITIONS DU MANAGEMENT (PERSONNEL, ORGANISATION, INFORMATION, OUTILS)		INDICATEURS : PROCESSUS ET CONDITIONS DU MANAGEMENT (PERSONNEL, ORGANISATION, INFORMATION, OUTILS)		INDICATEURS : PROCESSUS ET CONDITIONS DU MANAGEMENT (PERSONNEL, ORGANISATION, INFORMATION, OUTILS)	
MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION		MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION		MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION		MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION		MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION		MODELES ET STRATEGIES DE DEVELOPPEMENT DE L'IRRIGATION	
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PETITE HYDRAULIQUE EN MILIEU RURAL		** CONDITIONS TECHNIQUES ET ORGANISATIONNELLES DE L'AUTOGESTION		** ASSISTANCE TECHNIQUE A LA GESTION DE L'EAU		** ETUDE COMPARATIVE DU MANAGEMENT DANS DES CONDITIONS TRES VARIEES		** ASSISTANCE TECHNIQUE A LA GESTION DE L'EAU		** ETUDE COMPARATIVE DU MANAGEMENT DANS DES CONDITIONS TRES VARIEES	
* AMELIORATION DES TECHNIQUES DE POMPAGE ET DISTRIBUTION		* ASSISTANCE TECHNIQUES		* ALLOCATION ET DISTRIBUTION DE L'EAU		* PROCESSUS DE DESENGAGEMENT		* ASSISTANCE TECHNIQUES		* PROCESSUS DE DESENGAGEMENT	
* IMPACTS ET ORGANISATION REGIONALE		* ANALYSE DE LA DIVERSIFICATION AU NIVEAU DE LA FERME		* SYNTHESE DES EXPERIENCES DE REHABILITATION		* INTERACTION CONCEPTION - MANAGEMENT		* ANALYSE DE LA DIVERSIFICATION AU NIVEAU DE LA FERME		* SYNTHESE DES EXPERIENCES DE REHABILITATION	

Niger River Valley

The type of irrigation organization developed along the valley of the river Niger represents an advanced stage of farmer participation in the management of medium scale irrigation systems (200-500 ha on average, but sometimes over 1000 ha) ; an orientation which interests most of the Governments in the region.

IIMI is interested in studying the conditions under which the irrigation systems in the Niger valley are planned, developed, and managed. Specifically these conditions include :

- Integration of irrigated agriculture (double cropping of rice with 9 tons/ha a year!) with other on-farm or off-farm activities ;
- The organization of farmers into operational sub-groups attached to the cooperative of the scheme ;
- The particular role of the Government agency in providing technical assistance, without actually managing the system (the farmer's cooperative's responsibility) ;
- A variety of design and management inter-action concepts (pumping in stages, open/closed systems).

Major Governments concerns are reducing pumping costs, by more efficient irrigation water management practices (pumping operations according to electricity charges, and monitoring and detection of water wastes), as well as diversification of agricultural production.

Senegal River Valley, Senegal/Mauritania

Important investments have been made in irrigation development in the Senegal river valley : the Diama dam, in the Senegal river delta, to prevent sea water intrusion (operational since 1986), and the Manantali storage dam expected to be operational in 1988, permitting the irrigation of some 240,000 ha in Senegal, 125,000 ha in Mauritania, and 10,000 ha in Mali. A special project called "apres barrage" (post dam) is to be implemented to realize the project's full potential, irrigation as well as others.

The Senegal river valley presents an extreme diversity of conditions. Climatologically rainfall increases in the direction of the upper valley, offering increased possibilities for rainfed agriculture (quasi absent in the delta). Pedologically, conditions include heavy basin clay soils only suitable for rice, levee soils favorable for crop diversification, and very permeable sandy soils. Socio-economic factors include different tribes, objectives (those within the farming community and those of the state), systems of land tenure, and migration (to France in particular).

Different types of land reclamation and irrigation development include small village systems (10-20 ha), intermediate systems (200-300 ha) and large systems (up to 3000 ha), with different management models.

The extensive changes that are expected, the great variety of conditions present, and the new agricultural policy of government disengagement in the Senegal River Valley, require considerable efforts in the field of research and development. It is towards that end that a protocol for cooperation has been signed between SAED (Senegal Valley Development Authority) and ISRA (Senegalese Agricultural Research Institute). Within this framework, IIMI envisages the implementation of its collaborative research program in Senegal. A similar, but more modest arrangement is under consideration for the Mauritanian part of the valley.

6. PROFESSIONAL DEVELOPMENT PROGRAM

It is envisaged that IIMI's West-African Professional Development program will include the same components as IIMI's established program for Asia: individual programs, courses, and workshops or seminars. IIMI's Professional Development Program will closely reflect IIMI's mandate in irrigation management by stressing management issues rather than technical irrigation skills (there are already a number of on-going training activities in that field).

Individual Programs

This category includes the Fellowships Program (at masters, doctoral, or post-doctoral level), Special Awards Program, and on-the-job training. Although no details on this part of the program can or should be given at this stage, priority should be given to those persons and issues that could promote transfer of similar irrigation management experiences within the countries of the region as well as between those of Africa and Asia. IIMI is in a unique position to promote such transfers in view of its activities on both continents.

Workshops

A limited number of workshops are envisaged in close association with IIMI's Research and Development Program. Three different levels are considered: national, regional, and international.

At the national level the main purpose would be to promote inter-institutional cooperation and to mobilize interest and support for the program.

Exchange of information and field experiences should be the main purpose of workshops at regional level. Regional consultations should also relate to IIMI's Research and Development or Professional Development Program. IIMI's Research and Development program is designed to enable particular subjects to be studied in particular countries. However, study results will have regional

or international applicability. Once the program is well underway, the possibilities for organizing regional workshops on well defined subjects should therefore be considered.

Irrigation experience in West Africa is very recent compared with that in Asia. There are (and have been) strong linkages between Western irrigation establishments and irrigation bureaucracies in Africa and Asia, but there have been relatively few opportunities for direct Asia-Africa linkages. It is therefore proposed to organize a workshop whose primary objective would be to map out Asian experiences that are relevant for irrigation development in Africa. The workshop will be preceded by a limited number of preparatory comparative analyses.

Courses in Irrigation Management

Clear distinction should be made between decision making on the one hand and execution of what has been decided on the other. Proper water distribution requires the switching on and off of pumping stations, the opening and closing of gates, or the operation of some other kind of control structure. What is generally lacking is the awareness that behind these physical activities there is a process of decision making that ultimately has led to these activities. Decision making processes will therefore be the central theme of a regional training program in irrigation management.

The course is intended for those with day-to-day managerial responsibilities. The main target group will be the "Chefs de Perimeter" (system leaders), "Chefs de Casier" (area leaders), or their equivalent, a total of about 175-225 people in EIER member countries. Assuming a 50 percent participation, this would mean a total group of about 100 people to be trained in irrigation management as explained above. Taking into consideration the frequent turn-over in positions, the annual need for this type of training would be about 40-50 persons.

Content and methodology, duration, and organization, still have to be developed. However it is expected that the main part of the course would include exercises and discussions based on case studies of various situations that occur (or could occur) in day-to-day management which require a decision from the Chef de Perimeters. Due attention will also be given to the inter-relationships between technical and administrative conditions on the one hand and managerial issues on the other.

7. COMMUNICATIONS PROGRAM

IIMI's Communication and Information Exchange program proposes to seek the cooperation of interested regional organizations, CILSS and CIEH in particular, to manage a sub-regional communication program. Its publications would focus on irrigation management issues relevant to the Sahelian region of West-Africa. This program would also act as a regional relay station of the main documentation center on irrigation management that IIMI is establishing at its headquarters in Sri Lanka.

8. ORGANIZATION

Governance

IIMI's West-African program shall be administered by a Regional IIMI Representative/Director, responsible to the Director General of IIMI or his designate. He or she will be responsible for the operation of IIMI's West-African program and for ensuring that the programs and objectives are properly carried out.

IIMI's Governing Board will be responsible for the development and/or approval of programs and for policies under which IIMI's West-African program would operate, with due consideration to the needs of the area and in close collaboration with concerned national agencies and regional organizations.

Internationally recruited Resident Staff appointed under the regional program will come under the direct responsibility of the Regional Representative/Director. Research assistants and other local staff will be selected, recruited and financially supported by IIMI under the direct responsibility of the Resident Staff.

Agreements

IIMI's program in a specific country will be based on an umbrella type agreement with the Government concerned, by which the Government will recognize IIMI as an autonomous, international, non-profit, educational and training organization with objectives and activities as set forth and ensured by its charter. Privileges and immunities shall be applied accordingly.

In addition cooperative agreements will be concluded with national institutions, agencies or organizations. Such agreements will specify the objectives of the program, workplan, resources and responsibilities of each party. It is intended to also conclude cooperative agreements with CIEH and EIER whose fields of interest are closely related to those of IIMI. It is expected that such cooperation could be beneficial to all parties.

Meetings

Annual meetings would be held at regional level with those agencies or institutions with whom IIMI has concluded cooperative agreements. The purpose of these meetings would be to define research and development programs at the national level, to follow their progress and to ensure their consistency and continuity.

These meetings will function as regional program committee meetings, whereby the ultimate responsibility for the program remains with IIMI's Governing Board. Regional organizations such as CIEH and EIER will also participate in the meetings.

Meetings or workshops for regional dissemination of research results

would be held depending on the progress made by the Research and Development program. They would focus on specific issues of common interest to a wider range of organizations in the region than those directly involved in the program through cooperative agreements. (See also workshops.)

Periodic meetings would also be held on research and development activities at national level. These meetings or workshops would evaluate the research and development activities on a regular basis. Participation of active or potentially interested institutions would be encouraged. (See also workshops).

To assure coherence with IIMI's overall program requires close interaction between IIMI's Headquarters in Sri Lanka and IIMI's West-African program. This means frequent visits for coordinating and support purposes, not only between IIMI's Headquarters and the West African program, but also between the West-African program and IIMI's branch in Pakistan, its activities in Morocco and elsewhere.

The ultimate objective is to develop a coherent, real international program on irrigation management research by strengthening the links between the various regional components of IIMI's program.

9. PROGRAM INITIATION

To initiate the program it is proposed to appoint a Regional Representative to be stationed in Ouagadougou for a period of one year. It is expected that this temporary representation would develop into a permanent one within the framework of the long-term program. The major tasks of this regional representative office during the first year of program initiation (Year 0) follow.

General Activities

1. Set up IIMI's temporary sub-regional office in Ouagadougou (Burkina Faso).
2. Establish contacts on a regular basis with appropriate regional organizations represented in Ouagadougou.
3. Liaise with donor agencies and prepare a review of their activities and fields of interest in matters of irrigation development.
4. Elaborate further and in more detail the various program areas identified and formulate detailed action programs taking into account on-going related activities.
5. Prepare detailed proposals for prospective donors in accordance with their particular fields of interest and IIMI's mandate and program.

6. Identify local institutions with which IIMI could cooperate taking into account factors such as motivation, commitment, capabilities, and relevancy.
7. Handle administrative matters and relate to IIMI Headquarters and other points of external support to carry out the planned activities.
8. Explore the interest and possibilities of including English speaking West-African countries in the regional network.

Research and Development Program

1. Review and select representative research and development options that are of particular interest to West Africa and to IIMI's program.
2. Explore the prospects for cooperation with national institutions (research institutions, development agencies, and universities) to implement a research and development program in a particular country.
3. Negotiate with national agencies concerning the terms and conditions for the establishment of an IIMI program in that country.
4. Formulate detailed plans of operation for each of the selected research and development programs in each country.

Professional Development Program

1. Prepare a review on-going training activities in the field of irrigation in the countries concerned.
2. Elaborate further on a regional course in irrigation management in close cooperation with EIER and CIEH and formulate a proposal to be submitted to prospective donors.
3. Elaborate further a proposal for a workshop on Asian experiences relevant to African irrigation development and explore possibilities for donor support.

Communication and Information Exchange Program

Explore the technical and financial feasibility of a communication and information exchange program.

10. MEANS OF OPERATION

Cost Estimates

The table below summarizes the cost estimates for program initiation, the regional office and each of the six program components.

Program costs.

(All rounded figures in US dollars)

Program Initiation	345,000	(one year)
Regional Office	1,235,000	(four years)
R and D Burkina Faso	1,655,000	(" ")
R and D Office du Niger (Mali)	1,455,000	(" ")
R and D Niger Valley (Niger)	1,305,000	(" ")
R and D Senegal River Valley	1,410,000	(" ")
Professional Development	985,000	(" ")
Communications	450,000	(" ")

Tables 1 gives a more detailed general view of cost estimates, while in Table 2 the costs of program initiation (Year 0) and regional office (Year 1 through 4) are further specified.

Staffing

Internationally recruited staff the requirements are :

1. One Regional Representative for a period of one year for program initiation.
2. One Regional Representative/Program Director for a period of four years, responsible for program implementation.
3. One full-time irrigation management training specialist for a period of two years, supported by six months of international management consultancies.
4. One Resident Staff for each Research and Development activity to be included in the program, supported by a variable number of international consultancies.

In terms of locally recruited staff the program would require a number of research assistants, editorial, secretarial and administrative support staff, drivers, and casual laborers. More details are given in the project proposals.

11. SCHEDULE OF IMPLEMENTATION

The present document presents prospective opportunities for irrigation management research and development in Burkina Faso, the Niger and Senegal River Valleys and the inner delta of the Niger in Mali ("Office du Niger").

It is suggested that the Research and Development program will be implemented as a research and development network, selecting one central research theme per country, (based on a typical irrigation development model or strategy) and a mechanism to associate interested organizations from other countries with that particular part of the program. All countries visited expressed interest in all four components of the Research and Development program.

Each of the program components identified can be implemented independently from the others. Simultaneous implementation in the context of a consistent and coherent research network however has a number of advantages.

It could better contribute to the development of knowledge, principle and expertise by offering a greater, less location specific, variety of conditions for comparative analysis of aspects of irrigation management

It would promote program coherence. Not only with respect to the implementation of the Research and Development program on themes of general or specific interest, but in particular between the Research and Development program on the one hand and those of professional development and information exchange on the other.

It would considerably strengthen regional cooperation and dissemination of knowledge in irrigation management in the context of active engagement, which is lacking at the moment.

It would increase implementation efficiency, particularly in terms of development of methodologies and technical backstopping, not just serving the purpose of one project, but to the benefit of other program components as well.

Although simultaneous implementation would have a number of advantages, there are a number of constraints -- administrative, operational and financial -- that have to be taken into consideration. This means that the program will have to be implemented in stages, depending on the rapidity with which these constraints can be overcome. It should also be noticed that the prospective areas identified should not exclude research and development activities in other countries of the West-African sub-region.

A meaningful schedule of implementation can therefore only be drawn up after a more detailed analysis of the above mentioned considerations and constraints. This is one of the issues that should be considered during the proposed Year 0 (Program Initiation).

12. TABLES

Table 1. General view of cost estimates in US dollars

Table 2. IIMI West Africa Research and Development Program : Regional office budget estimate

Table 1. General view of cost estimates in US dollars

	Program Initiation	Regional Representative Office	Professional Development Program	Communication Program	Research & Development Program				
					Burkina Faso	Niger valley (Niger)	Office du Niger	Senegal River valley	Others
Duration in years	1	4	4	4	4	4	4	4	
International Staff	120,000	480,000	248,000	--	400,000	400,000	400,000	400,000	
National Staff	16,000	110,400	32,000	156,000	222,800	138,300	175,200	260,000	
Travel, Missions, Consultancies	60,000	208,000	124,000	20,000	120,000	110,000	120,000	110,000	
Supplies, Services, Lease Hold Impr.	37,000	140,000	73,000	145,000	218,000	178,000	218,000	170,000	
Equipment	54,000	91,000	53,000	55,000	418,000	260,200	300,200	233,200	
Courses	--	--	140,000	--	--	--	--	--	
Regional Workshops	--	--	75,000	--	--	--	--	--	
Afro-Asian Workshops	--	--	75,000	--	--	--	--	--	
Sub-Total	287,000	1,029,400	819,000	376,000	1,378,800	1,087,000	1,213,400	1,173,200	
Indirects Costs (20%)	57,400	205,900	163,800	75,200	275,800	217,400	242,700	234,600	
Total	344,400	1,235,300	982,800	451,200	1,654,600	1,304,400	1,456,100	1,407,800	
Rounded figures	345,000	1,235,000	985,000	450,000	1,655,000	1,305,000	1,455,000	1,410,000	

Table 2. IIMI West Africa Research and Development Program : Regional office budget estimate

IIMI - WEST AFRICA RESEARCH & DEVELOPMENT PROGRAM : REGIONAL OFFICE

Workers = Keepers = Gardners = 100 x 13 x 1.4 = 1820 Driver = 200 x 13 x 1.4 = 3640
 Direction Secretary = 250 x 13 x 1.4 = 4550

Year	0	1	2	3	4	TOTAL
<u>IIMI STAFF</u>						
1 Resident Director	120,000	120,000	120,000	120,000	120,000	600,000
<u>NATIONAL STAFF</u>						
Admin. Assistant	5,000	10,000	10,000	10,000	10,000	45,000
Fellowships	--	--	--	--	--	--
3 Workers/2 Drivers	7,000	13,000	13,000	13,000	13,000	59,000
1 Secretary	4,000	4,600	4,600	4,600	4,600	22,400
<u>TOTAL NAT. STAFF</u>	16,000	27,600	27,600	27,600	27,600	126,400
<u>SUPLIES AND SERVICES</u>						
House Renting	10,000	10,000	10,000	10,000	10,000	50,000
RD Prog. running expen.	17,000	20,000	20,000	20,000	20,000	97,000
<u>TOTAL SUP & SERV</u>	27,000	30,000	30,000	30,000	30,000	147,000
<u>EQUIPMENT</u>						
1 Car (normal)	18,000	20,000	--	20,000	--	58,000
Cars (4 wheel drive)	--	--	--	--	--	--
1 Motocycle/motobyke	2,000	2,000	--	4,000	--	8,000
Experiment. equipt	--	--	--	--	--	--
Office equipt	18,000	26,000	--	10,000	--	54,000
House equipt	16,000	9,000	--	--	--	25,000
<u>TOTAL EQUIPMENT</u>	54,000	57,000	--	34,000	--	145,000
<u>LEASE HOLD IMPROVE</u>						
	10,000	10,000	--	10,000	--	30,000
<u>TRAVELS AND MISSIONS</u>						
Inter. & Loc. Missions						
Nat. Workshops						
<u>TOTAL I.M.</u>	60,000	52,000	52,000	52,000	52,000	268,000
	(including exploratory missions in English speaking countries)					
<u>OTHERS</u>						
Indirect costs(20%)	57,400	59,300	45,900	54,700	45,900	263,200
<u>TOTAL</u>	344,400	355,900	275,500	328,300	275,500	1579,600

<u>OFFICE EQUIPMENT</u>		<u>TRAVELS - MISSIONS</u>	
Furniture for R. Director	= 9,000	From IIMI	= 100 x 100 = 10,000 US\$
Furniture for Secretary	= 3,000	From R. Direc.	= 120 days x 100 = 12,000
Air Conditioners (4)	= 6,000	Local Trip	= 5,000
Teleph. Telex	= 10,000	International Trips	= 15,000
Typewriter machine	= 1,500	Workshps for program	= 10,000
Computer	= 5,000		
Photocopier	= 6,000		
Miscellaneous	= 4,000		
	44,000 US\$		

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