IIMI

ANNUAL REPORT 1984-85

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INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE

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Director General's Foreword

During the past two decades, irrigation schemes have become among the most favored development projects in Asia, Africa, and Latin America because of their importance in achieving sustained agricultural development. The remarkable increases in rural income and food production in Asia--which contains about 85 percent of the developing world's irrigated area--are a result of the combined effects of introducing modern agricultural technology and investing in new irrigation capacity. Several countries with irrigation potential have devoted over three-fourths of their public spending for agriculture to irrigation projects.

Unfortunately, most of the benefits of irrigation development have stemmed from the magnitude of the investment, not from highly efficient and productive systems. Returns on irrigation investments have been disappointing, and the net incomes of farmers in irrigated areas are still far from their full potential. Water distribution is frequently inequitable, unpredictable, and inadequate.

In June 1984, the International Irrigation Management Institute (IIMI) was established in Sri Lanka with a mandate to strengthen national efforts to make more productive use of irrigation systems. IIMI was born of two quite different traditions: From the international agricultural research center system came the tradition of multidisciplinary research in association with training and information exchange; and from the experience of irrigation project planning and operations came the practical, problem-solving perspective necessary to translate research on irrigation management into tangible gains in performance and productivity.

IIMI's programs of research, training, and information exchange are designed to give guidance and insight to those planning and managing irrigation systems. Our clientele include those concerned with efficient and productive planning, financing, and managing of irrigation systems in and for the developing world. By seeking answers to specific questions, IIMI provides national and international agencies with methodologies and analytical understandings which they can use in making more effective use of irrigation.

During 1984-85, we began operations by assembling at our Headquarters in Sri Lanka a team of eleven internationally-recruited staff specializing in engineering, economics, and the agricultural and social sciences. This team was strengthened with nationally-recruited support staff.

Although this small Headquarters staff gives IIMI a range of experience and expertise, the Institute's strengths stem from its decentralized nature and its emphasis on collaboration with national agencies. Within seven months of the Institute's establishment in Sri Lanka, we started an associated program in the Philippines through a Resident Scientist and his small team, and by the end of 1985 we had established a Resident Scientist in Indonesia and one in Nepal.

During 1985 we laid the groundwork with the Government of Pakistan to establish a collaborating and participating unit of the Institute -- an IIMI Branch -- near Lahore that would take the lead in organizing research on irrigation in the arid tropics. Also, two missions travelled through nine African countries to explore irrigation management issues and assess the levels of interest in those countries for collaborative programs with IIMI.

We began research during the year to identify and field-test irrigation management practices appropriate for non-rice crops grown in parts of irrigation systems designed and normally operated for rice. These studies were strongly recommended by many countries in Asia which have

recently made remarkable gains in rice production and are searching for technologies to help produce other crops which will be more profitable for farmers. We began the studies in Sri Lanka, Indonesia, and Philippines.

Another important study was organized to review the experience in five Asian countries regarding options for financing the operational costs of irrigation systems, and to outline realistic roles farmers could be expected to play in mobilizing part of those resources through both monetary and in-kind support. The first phase of this research, conducted in collaboration with the Asian Development Bank, was completed by the end of the year.

During 1985 IIMI held five international workshops and seminars, and in May organized and co-sponsored with the World Bank's Economic Development Institute the annual six-week training course on "Planning and Management of Irrigation Schemes in Asia." Our graduate research program began with six Ph.D. and Masters students conducting their research with us. In mid-1985 we started a Library and Documentation Service which will provide researchers with access to information on irrigation management. We also began publishing and disseminating information to link together people with an operational or research interest in managing irrigation systems.

One of the most attractive features of the Institute is its Headquarters in Digana Village about 14 kilometers from Kandy, Sri Lanka's second largest city. Built on a former plantation, the Village is at an intermediate elevation which makes air-conditioning unnecessary, and puts the staff within a few hours drive of all major irrigation schemes. The Government of Sri Lanka has generously offered IIMI the use of many facilities in the Village and plans to build a new headquarters building for the Institute there.

My staff and I are excited by the challenge and excitement of this first 18 months of IIMI. It has been a period of planning the broad strokes of IIMI's future while implementing the details of day-to-day operations. We look forward in 1986 to testing and refining our program concepts, and expanding our activities in useful directions. We have found that the demand for IIMI's services far exceeds both our staff and our financial resources. We are convinced that the concepts on which IIMI was founded are sound, and we are grateful for the confidence expressed in us by the Governing Board, the Support Group, and the community of irrigation professionals.

Thomas Wickham
Director General

The Establishment of IIMI

The International Irrigation Management Institute (IIMI) was formally launched on 1 July 1984 at its Headquarters in Sri Lanka. It is appropriate in the Institute's first Annual Report to review the events leading up to IIMI's creation.

The First Steps

Two events in 1969 began the 15-year process that established IIMI. The first was a Bellagio Group proposal that stressed the importance of water management in agricultural development. The second was a joint proposal by the Ford and Rockefeller Foundations that recommended establishing an international center to carry out multidisciplinary research on irrigation technologies, the economics of water management at national and farmer levels, and water policy issues at national and international levels.

Water management issues resurfaced again at the 1971 meeting of the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR). TAC recognized the importance of water in agricultural production but deferred discussion of a center for irrigation management until completion of a crop-water research report by the Universities of California and Utah, with assistance from Canada's International Development Research Centre (IDRC). TAC discussed that report at its 1973 meeting, and then directed the five established CGIAR centers to report their current research efforts in water management.

Between 1973 and 1978 the initiation of a center for water management research remained on the TAC agenda in the form of various commissioned reports and discussion papers. In 1975, the Food and Agriculture Organization (FAO) submitted a paper on "Water Use and Management" that stressed the need for action in two directions: 1) research at the field level to improve and adapt local technologies and operational methods, and to identify constraints to improved water management; and 2) research at the national and international levels to coordinate water management activities in the field, and backed by appropriate information and training services. In 1979, TAC presented its third priorities paper to the Bellagio Group. Water management research was second on the list of selected initiatives to be undertaken as additional funds became available.

In 1980, TAC received results from a two-year study conducted by an IDRC-sponsored research team. The team recommended establishing an International Center for Research and Training in Irrigation Technology to study operating systems in the arid and semi-arid regions where successful agriculture demanded irrigation, as well as in the

semi-humid tropics. On receiving the report, TAC prepared and submitted a draft proposal to the CGIAR at its October meeting in Manila.

The CGIAR decided against any action at this meeting and referred the issue back to TAC, while they commissioned another study team to review and generate alternative proposals. The team visited numerous countries and irrigation projects, and in February 1982 recommended to TAC that an International Irrigation Management Institute be established and funded by CGIAR.

At its May 1982 meeting in Paris, the CGIAR concluded it financially imprudent to add to the number of centers already funded -- a number that had increased from 5 to 13 between 1969 and 1982. However, the CGIAR encouraged members to explore the possibility of establishing a center along the lines recommended by TAC but without the CGIAR's formal sponsorship. It requested interested members to mobilize additional resources to support the new center. In the following seven months there was rapid progress towards the establishment of IIMI.

Preliminary Site Selection

Immediately following the 1982 CGIAR meeting, interested members asked the Ford Foundation to act as Implementing Agency for the establishment of IIMI. Ford sent a team to visit India, Sri Lanka, Pakistan, and the Philippines to ascertain their interest in hosting the Institute. Officials of the Indian government expressed interest in establishing the Institute in India. In Sri Lanka, the team met with the President and senior government officials, and visited irrigation projects and a potential headquarters site at Digana Village. The Government of Sri Lanka indicated its full support for the Institute. In Pakistan, meetings with senior government officials, including the President, brought similar support for the proposal.

Given the strong support for the IIMI proposal in the countries visited, the Ford team recommended in August 1982 that potential donors meet before the November CGIAR meeting in Washington, D.C. to discuss formally establishing IIMI.

The IIMI Support Group

The IIMI Support Group evolved from a meeting on 5 November 1982 that included 16 agencies, 2 invitees, and an observer. The Group accepted the general lines of the proposal recommended by TAC to the CGIAR. IIMI would consist of a headquarters unit and cooperating units based in various countries, each with a

mandate for research, training, and information exchange in irrigation management. The Support Group would arrange financing to establish IIMI, determine initial funding levels and policies for its continued operation, and create a Governing Board.

In early 1983, the Support Group authorized the Ford Foundation to enter into negotiations with the Government of Sri Lanka. Plans were made to select the Governing Board and identify candidates for Director General. The World Bank was confirmed as interim custodian of funds contributed by the Support Group. The total budget requrements for IIMI's first five years was estimated at US$12 million.

Formal Establishment

On 1 September 1983, the Memorandum of Understanding was signed by the Government of Sri Lanka. Shortly afterwards, the first Board Meeting was held in Colombo. Ralph W. Cummings was appointed Acting Director General with responsibility to establish the Institute. This included preparing a draft Charter which would form the legal basis for the Institute in Sri Lanka and in other countries where IIMI might have cooperating and participating units. The Charter was ratified on 31 May 1984 by executive action through the Ministry of Foreign Affairs.

On 15 June 1984, Thomas Wickham was appointed Director General and IIMI began formal operations at its Headquarters in Digana Village near Kandy. On 30 November, the Parliament of Sri Lanka enacted legislation to formally establish IIMI as a corporate body, international in character, with legal status and privileges, immunities, and character as set forth in the Memorandum of Understanding and the IIMI Charter.

This legislation enabled the Implementing Agency to relinquish its role, and on 1 January 1985 IIMI's Board and staff assumed full responsibility for the Institute and its operations.

IIMI Research Concepts

IIMI's goal is to strengthen independent national capacity to manage irrigation systems. This is done by identifying and carrying out research on selected issues, by promoting the professional development of people who can assume greater leadership and responsibility in managing systems, and by exchanging information with people involved in efforts to improve irrigation management.

Research Concepts

Field research is conducted collaboratively with interested partners in Sri Lanka and other countries. The Institute's research program focuses on:

- Management, rather than design, of systems.
- Performance of irrigation in response to management.
- Applied field research to validate more broadly-based models.
- Comparative research, both geographically and over time.
- Research to integrate the effects of different disciplines. Policy-oriented research.

The selection of research topics is an iterative process involving consideration of many factors. Three categories of research are particularly well-suited to IIMI: research leading to improved conceptual understandings of irrigation management, research leading to improved methodologies suitable for use by IIMI and others, and selected field research leading to answers to a few specific problems.

Research to develop conceptual understandings includes development of a framework to understand the evolutionary processes of irrigation systems as they respond to changing economic, physical, and institutional conditions. Methodological research includes searching for and testing new variables to describe system performance, such as a simple measure of water adequacy under field conditions. Research on specific field problems includes studies on how to manage irrigation systems that have been designed and operated exclusively for rice in ways that meet the needs of non-rice crops in selected areas.

By focusing on conceptual and methodological issues with broad applicability, IIMI uses its unique position as an international organization to provide results which can be used in national programs or by international agencies. Selected applied research topics are taken up in collaboration with national agencies whose programs support such conceptual and methodological research activities, where solutions are of interest to several countries, and where national agencies are not yet in a position to undertake the research alone.

Research Collaboration

With limited resources and no irrigation systems of its own, IIMI cannot carry out research on its own. All field research is therefore planned in collaboration with appropriate national organizations in order to provide access to operating systems over a range of conditions. In most cases, these are the government agencies responsible for planning and operating irrigation systems. Officials of these agencies help plan and organize the research, select suitable sites, and assist in field activities. Such interaction supports the Institute's professional development role, and is central to its mandate.

Research Networks

IIMI's research strategy uses networks to extend its contribution in irrigation management beyond the range of direct Institute involvement.

Where there is effective demand for a study in several countries, an IIMI-supported network research project may be established. Under a network project, research with shared objectives and methodology may be conducted simultaneously in several locations by national organizations in close association with IIMI. The work at each location must be of interest to the participating national organizations, while IIMI's concern is with exchanging information and sharing comparative findings with others.

The importance of the network concept lies in its potential for cross-country studies and in the relationships it fosters between IIMI and national organizations. By working within a network framework, Institute staff become familiar with national priorities and interests, while collaborating staff from the national agencies gain experience through their association with Institute programs.

The Research Framework

IIMI's field research aims to generate new understandings about managing irrigation systems, provides a forum for interaction with irrigation managers, and supports on-the-job training for researchers from developing countries. The Institute's research findings are reported in workshops and publications, and through informal contact between staff and other professionals interested in irrigation management.

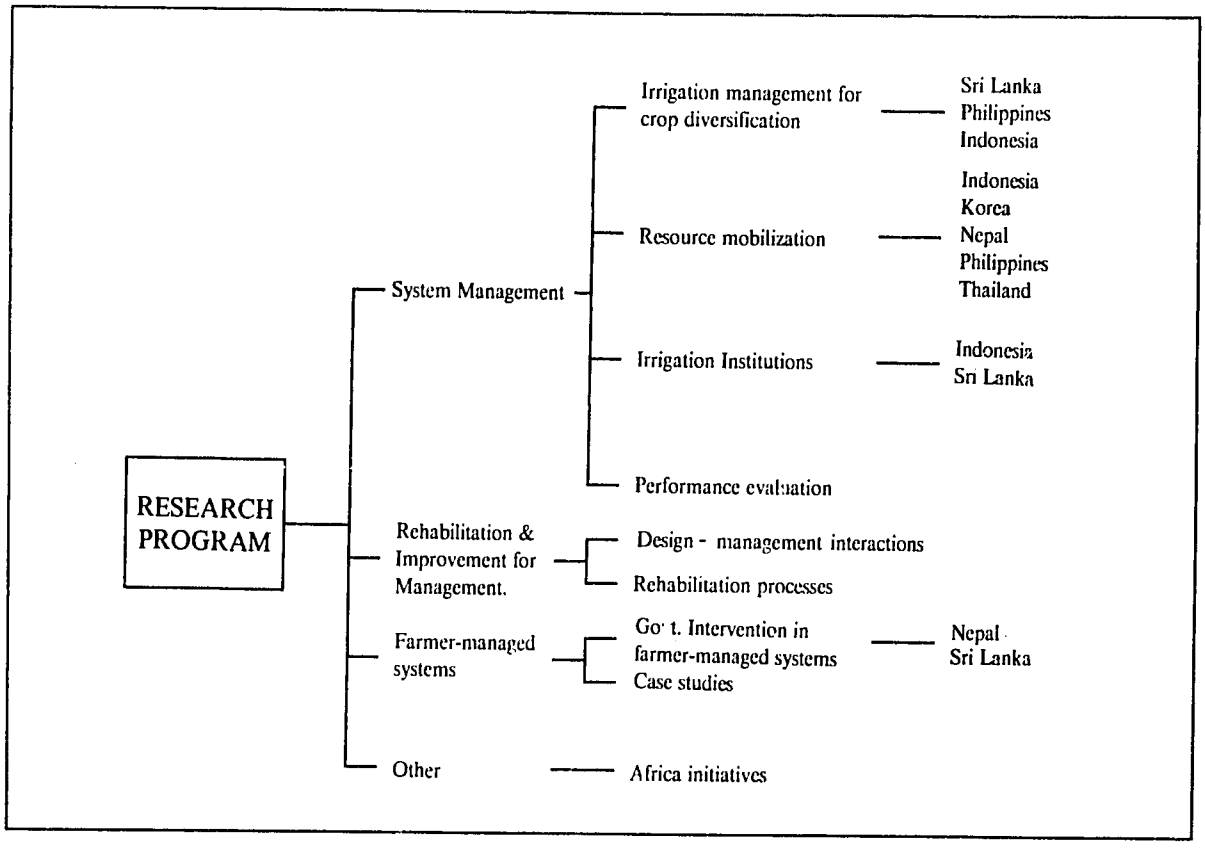
IIMI conducts research through multi-disciplinary teams that study field irrigation problems in the context of whole systems. The framework for that research is outlined in this chapter.

Research Areas

Three initial program areas for research have emerged:

- System Management.
- Rehabilitation and Improvement for Management.
- Farmer-Managed Irrigation Systems.

System Management. Research in system management focuses attention on the ways irrigation systems are planned, operated, and maintained. It is also concerned with the impact



of external factors which affect the objectives of the system, the inputs and outputs from the system, and the role of national and regional irrigation policies. The purpose is to identify irrigation management practices which improve the performance of irrigation systems, particularly those systems controlled by project authorities or irrigation agencies. To do this effectively, researchers look at management strategies and practices holistically; that is, at all levels of the system from the headworks to the conveyance and distribution systems to farmers' fields. This approach enables researchers to accurately define the scope of an irrigation "system" without restricting the analysis to only those parts falling within the official command area.

Rehabilitation and Improvement for Management. Many countries, particularly those in Asia with large tracts of irrigated land, are reaching a new phase in irrigation development. With fewer opportunities for new irrigation projects and with changing agricultural priorities, investments are increasingly being made or contemplated to rehabilitate and modernize existing systems. Recent experience indicates many unanswered questions about how best to plan and implement such projects. Usually, rehabilitation means restoring a system to its original design without considering initial shortcomings or changes that may have occurred in the system or its environment since operations began. A feature of most rehabilitation projects is a lack of interaction between the design and construction process and the management process after the system has been improved. IIMI research will explore these interactions and modified designs which will promote manageability.

Farmer-Managed Irrigation Systems. A significant portion of irrigated land in most developing countries falls under the command of farmer-managed systems. Many of these systems are relatively small and some are very old; others have been built more recently with assistance from public agencies. With the growing awareness of potential benefits in agricultural production, many governments are seeking ways to assist farmer-managed irrigation. IIMI seeks to better understand farmers' management practices, and the interplay of institutional, agricultural, and physical factors affecting the performance of farmer-managed systems. The research has three objectives: 1) to identify farmers' irrigation management needs; 2) in collaboration with the relevant agencies, to identify appropriate and sustainable responses to those needs which will

not undermine existing institutions and management activities; and 3) to gain a better understanding of the principles underlying farmer management which might have relevance for agency-managed irrigation systems.

Other Research. There are three reasons for considering research activities which fall outside the program areas. First, the three primary areas may not be optimum, and other areas should be considered as alternatives. Second, IIMI should maintain flexibility to take up promising research that lies outside its mainstream program. Third, international research centers should devote some resources to research on issues that could have exceptional impact but carry a relatively lower probability of success.

Management Dimensions

Cutting across the research areas are five management dimensions closely related to the disciplines represented by core IIMI research staff:

- Physical Dimension
- Institutional and Social Dimension
- Biological Dimension
- Information Dimension
- Financial Dimension

Physical Dimension. The physical dimension includes aspects of water capture, allocation, and distribution. IIMI engineers and systems analysts work on issues related to the spatial, temporal, and hydraulic variability of irrigation to improve management.

Institutional and Social Dimension. This dimension concerns research on the organization and management of irrigation systems, and on the incentives and disincentives that affect those responsible for managing irrigation. IIMI will also research the interactions between the agencies and farmers in given social environments.

Biological Dimension. Crop-water responses to alternative irrigation methods are important in understanding the biological components of irrigation systems. This research is also designed to find ways to minimize adverse environmental impacts on physical and human environments.

Information Dimension. Information is essential to good irrigation management. Research focuses on ways to monitor irrigation, provide feedback to system managers, and improve information exchange between farmers and irrigation agency staff.

Financial Dimension. Because of factors external to the irrigation sector, many countries are reducing levels of support to their irrigation agencies, with consequent impact on operations and maintenance. IIMI is investigating options open to governments for financing irrigation and for improving cost recovery for recurrent expenses.

Geographic Scope

During 1984-85, the Institute's research program made important progress in Sri Lanka and other countries. This chapter reports first on field studies conducted within Sri Lanka, and then on those taken up in other countries.

Sri Lanka

In April 1985, IIMI staff, with the assistance of collaborating agencies, identified and began field research at a site in the North Central Province containing three irrigation systems. One system is operated by the Mahaweli Authority, one by the Irrigation Department, and one by farmers. All of the Institute's field work in Sri Lanka at present is conducted at this field location about 75 kilometers from Headquarters.

The importance of the Institute's Sri Lanka research stems from the rich diversity of local irrigation systems, and the need for Headquarters staff to maintain direct involvement with field studies close to home. The purpose of the research is to document existing irrigation performance levels and management practices in the three systems and, in the first two, to find irrigation practices that lead to more profitable and widespread production of diversified (non-rice) crops.

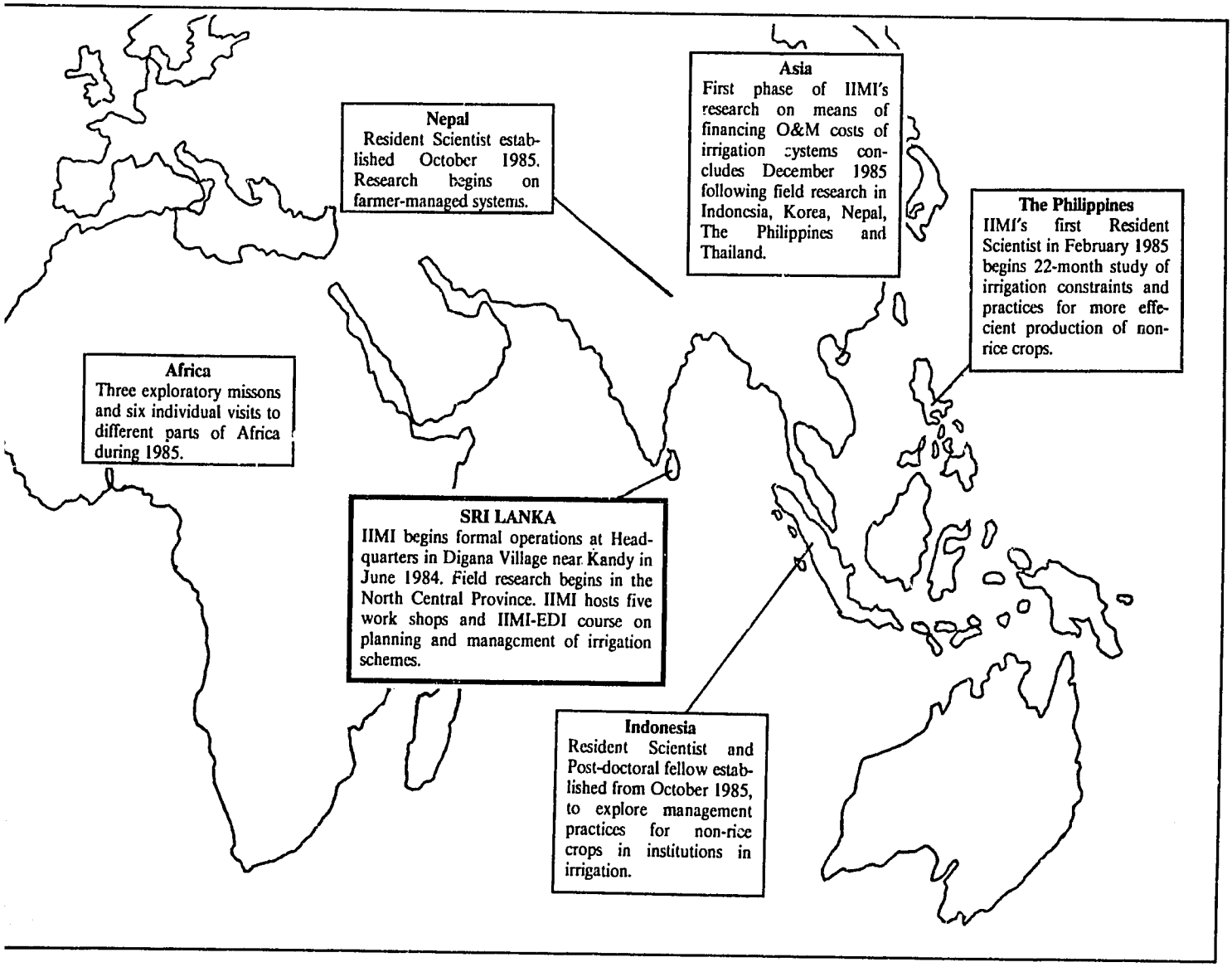
Locally-hired research assistants and research fellows are collecting data on agricultural, engineering, economic, and social science variables. Government officers collaborate by providing access to documents and sharing their insights through discussion. The agencies provide housing and office space and other support for IIMI staff.

The Philippines

In February 1985, IIMI started a 22-month study in the Philippines. A grant from the Asian Development Bank (ADB) enabled the Institute to hire its first Resident Scientist as Project Coordinator, and to recruit local staff to supplement the resources of the cooperating agencies. These agencies include the National Irrigation Administration, the Philippine Council for Agricultural

Resources Research and Development, the University of Southern Mindanao, Isabela State University, and the University of the Philippines at Los Banos.

The study explores constraints to producing non-rice crops within irrigation systems designed for rice, and methods of managing systems for successful production of diversified crops. Field research activities are based in three locations: the Allah River and Banga River Irrigation Systems in South Cotabato Province (Mindanao), the Magat River Irrigation System in Isabela Province (Northern Luzon), and the Cavite Irrigation System, Cavite Province (Southern Luzon).



Indonesia

With its core resources and a second grant from the Asian Development Bank, IIMI recruited in October 1985 a Resident Scientist and a Post-doctoral Fellow to manage its research activities in Indonesia. The program has benefited from the contributions of six irrigation staff seconded by the primary collaborating agency, the Directorate-General of Water Resources Development.

The research in Indonesia explores irrigation management practices for crop diversification, and institutional issues in system management and performance. Research sites were chosen in three irrigation projects in Java: Waru-Turi in East Java. Pemali Comal in Central Java, and Wilayah Cirebon in West Java. IIMI's research and that of the International Food Policy Research Institute (IFPRI), which is closely linked with the program, is subject to the overall guidance of a committee chaired by the Secretary General of the Ministry of Agriculture and Food Crops.

Nepal

The Institute began a program to support research on farmer-managed systems in regions of Nepal with extensive hill irrigation in October 1985. Support for the Nepal program is shared between the Ford Foundation (New Delhi Office), the International Fund for Agricultural Development (IFAD), and IIMI's core budget. The primary cooperating agency in Nepal is the Water and Energy Commission Secretariat (WECS), which is responsible for planning, surveying, and studying the irrigation and power sectors. IIMI is assisting WECS to strengthen its capability to commission, supervise, and interpret the research activities it sponsors.

The Nepal research examines government interaction with the farmer-managed irrigation sector. Consulting firms hired by WECS and advised by the IIMI Resident Scientist are conducting surveys in a number of farmer-managed systems in the Sindhu-Pulchowk District, not far from Kathmandu. The government proposes to rebuild two of these systems with the active participation of farmers in the design and construction stages, and to strengthen the basic institutional framework developed by farmers for operating and maintaining the systems.

In addition to his work in Nepal, the Resident Scientist spends a substantial part of his time developing similar research interests in countries with related geographical conditions, such as the northern parts of India, Pakistan, and Thailand. An international workshop planned for Kathmandu in 1986 will promote a network of researchers in farmer-managed irrigation among these countries.

Regional Activities in Asia

Institute staff and a small team of consultants visited Sri Lanka, Pakistan, Bangladesh, Thailand, Malaysia, Philippines, Indonesia, and Morocco during 1985 to identify research needs relating to institutional aspects of irrigation management. In each country, the team sought the views of government officials involved in planning or managing irrigation, and of researchers in universities and other organizations. A widespread interest emerged in participatory management approaches in which farmer organizations collaborate with agency officials to manage irrigation systems.

Management issues within government agencies and coordination among those with overlapping irrigation functions also emerged as important topics. To address these issues, IIMI is

considering one or more management case studies of national irrigation agencies. In a few countries, the team also encountered intense interest in research on policy options. The influence of bilateral donors and multi-lateral lending agencies on decision-making in irrigation planning was also identified as a potential research topic.

The team's findings were outlined at the International Workshop on Selected Irrigation Management Issues held at IIMI Headquarters, 15-19 July 1985. Insights gained by the mission will help guide IIMI's long-term research strategy on institutional aspects of irrigation management. In the short term, the recommendations have directly supported research in the Farmer-managed Irrigation program area and part of that in the Systems Management program area.

Regional Activities in Africa.

There have been expressions of interest in IIMI developing a program in Africa. Because the physical, economic, and social conditions of Africa are diverse and generally different from those of Asia, IIMI is proceeding carefully towards developing a long-term relationship appropriate for selected parts of Africa. As part of that process, the Institute carried out three missions and six individual visits to different parts of Africa during 1985.

In May 1985, an IIMI team led by the Director-General visited Morocco at the invitation of the Association Nationale des Ameliorations Foncieres de l'Irrigation et du Drainage. The team visited three major irrigation schemes and held discussions with university researchers, agency staff, and the Minister of Agriculture. Of particular research interest are the management implications of downstream-controlled irrigation systems and their relevance to countries of both Africa and Asia. Another important issue is the

integration of traditional farmer-managed irrigation systems into parastatal development authorities without destroying the pre-existing management structure. Based on the team's findings, IIMI now plans to include a research component in Morocco in its research program on design-management relationships.

In June 1985, the Institute's "Exploratory Mission to West Africa," with support from the Ford Foundation (Dakar Office), visited Senegal, Mali, Burkina Faso, and Niger. In each country the team found strong positive interest in irrigation management issues of relevance to IIMI's research activities. Although potential IIMI activities in West Africa would have different points of emphasis from those in Asia, there appear to be important benefits in relating African and Asian activities within one overall program. For example, there appears to be a greater relative role for professional development in Africa than that planned so far for Asia. Research on farmer-managed irrigation systems and the scope for increased management responsibility of farmers in larger systems is of particular relevance and interest to the four countries visited.

IIMI's "Exploratory Mission to East Africa" visited Madagascar, Sudan, Zambia, and Zimbabwe during November 1985. The team of two consultants and two IIMI staff explored the prospects for IIMI's activities and prepared a report on irrigation management in Africa. In each country, the team visited agency officials, donors, consultants, university researchers, and farmers. In Madagascar and Sudan, where there are large and important irrigation sectors, two highly relevant research issues emerged: farmer-management participation in Madagascar's Petits Perimetres Irrigues, and rehabilitation in Sudan's Gezira scheme. In southern Africa and particularly in Zambia, planning future irrigation strategies is of greater importance than research on existing systems.

Research Program

Two research activities were begun in 1985 in the Systems Management program area: irrigation management for diversified crops, and resource mobilization for operation and maintenance of systems. The first involves collaborative field research in Sri Lanka, Indonesia, and the Philippines; the second is a comparative study of irrigation cost recovery efforts in Indonesia, Nepal, Korea, the Philippines, and Thailand.

IRRIGATION MANAGEMENT FOR DIVERSIFIED CROPS

Initial research in Sri Lanka and the Philippines focused on appropriate management practices for crop diversification in selected parts of irrigation systems designed for rice. A number of constraints to crop diversification have been identified, some internal to the irrigation system and some external. Among the most important internal constraints are the operations and maintenance (O&M) procedures that have been developed over the years to support rice cultivation, and farm-level problems associated with cultivating crops sensitive to excessive water on fields normally used for rice monoculture. The dominant external constraint is in marketing. Rice tends to command a relatively stable price across seasons, whereas prices for other crops are more variable and the purchasing arrangements less well developed. Associated with all aspects of crop diversification is the establishment of appropriate institutional arrangements for irrigation system management, the ready availability of inputs, and the identification of those areas within irrigation systems where diversified crops have comparative advantage.

Field research addressed these issues in two Sri Lankan locations in the North Central Province (Devahuwa and Mahaweli H Block) and in three locations in the Philippines (South Cotabato, Isabela, and Cavite). Although data collection began only in 1985, first-season results indicate a number of interesting comparisons and contrasts among the various sites.

Sri Lanka

The two systems studied adopted different irrigation strategies to support widespread cultivation of non-rice crops during the dry season.

Devahuwa. There is insufficient water in the 1,214 hectare Devahuwa system to irrigate the entire area if rice is planted during the dry season. With a reservoir capacity of 12 million cubic meters and a demand between 2.1 and 2.4 meters of water for rice, the maximum area of dry-season rice cultivation is limited to less than half the command area. Dry season rice thus tends to promote economic disparities between head- and tail-end portions of the system. Due to national efforts to encourage crop diversification, operational practices have changed in recent years. Rice cultivation has been discouraged by limiting water deliveries according to the availability of water at the source. During the 1985 dry season, water issues were controlled from the main sluice of the reservoir, and issues were limited to two days in every ten. This irrigation frequency is considered adequate for non-rice crops but inadequate for rice, except on the poorly-drained low humic gley (LHG) soils found in valley bottoms. A range of upland crops was grown on the well-drained reddish brown earth (RBE) soils, including chilli, soybean, mungbean, and cowpea. Rice was cultivated mainly on the LHG soils.

Mahaweli H System. IIMI started field work in the dry season in Kalankuttiya Block, an area of 2,122 hectares that is commanded by a small

reservoir linked to the main reservoir at Kalawewa. Dry-season water issues from Kalankuttiya Reservoir were made four days each week -- much higher than those at Devahuwa. As with Devahuwa, temporary land reallocations were made within each secondary unit of the block. Farmers adopted the same cropping pattern: Non-rice crops on RBE soils and limited rice on LHG soils, although chilli was effectively the only non-rice crop.

Irrigation was first introduced in the Mahaweli H System in 1977, much later than that at Devahuwa, and the control structures there are generally in better condition. In addition, the main channel has been designed to maintain equitable head, or water elevation, at offtakes through the use of duck-billed weirs immediately downstream of almost every offtake. As a result, variation in head along the main channel is not excessive despite fluctuations in discharge issued from the reservoir. Functional gates allow greater control at each offtake. Data indicate that water deliveries into the sampled distributaries were reasonably equitable over the season.

Conclusions from both sites. The timing and duration of water issues were quite variable at both sites. This reflects both managerial shortcomings and a deliberate attempt to adjust for rainfall. With water deliveries scheduled only two days in ten as at Devahua, a longer period of water issue is critical in achieving higher yields. At the Mahaweli site, water is more readily available but the risk of over-irrigation or waste when excess water is passed directly into drains is also greater.

Although rice rarely suffers from excess water, upland crops may be damaged from soil saturation when irrigation issues are made during or immediately after heavy rainfall. Thus, a prompt response to rainfall is a managerial requirement for upland crop irrigation. Data show that system

management response to rainfall was not consistent. There were instances when the rate of water deliveries did not appear to be modified despite rainfall sufficient to maintain crop growth for several days. Further research will focus on how to accommodate deviations caused by rainfall in a predetermined issue schedule without making the schedule unpredictable.

The rotational issue schedules adopted in the two systems had varying time frames and managerial requirements. In Devahuwa, with primary control at the reservoir sluice, managerial emphasis was on control within secondary channels. A decision had been made to give all issued water to the upper half of all secondary channels on the first day, with the lower half receiving water on the second day. Because the main channel had to run essentially full, this strategy relied heavily on the ability to close the offtakes along the upstream reaches of the secondary channels on the second day at each rotation. Preliminary data indicate that this was only partially successful, a combined result of deteriorated structures with non-functioning gates, gates that were opened and closed at will by farmers, and insufficient staffing of the Irrigation Department.

The Philippines

In the South Cotabato and Isabela sites, irrigated maize was the preferred upland crop during the dry season. South Cotabato generally has sufficient rainfall to grow maize throughout the year without irrigation, while Isabela has pronounced wet and dry seasons similar to those of Sri Lanka. The wet and dry season pattern is also found at the Cavite site in Central Luzon where white beans are grown to support the local processing industries near Manila. At all three sites, water issue rotations were imposed on the system at the secondary level, with farmers at the tertiary level expected to share water at the turnout. This delivery pattern is comparable to that of the Mahaweli site in Sri Lanka.

Diversified crops in the Philippines tend to be interplanted with rice rather than grown separately, as is the case at the two Sri Lanka sites. The implications of this for water scheduling and planning are clear: It is difficult to avoid waterlogging upland crops and almost impossible to devise a water schedule that is compatible with widely differing crop moisture requirements. Indeed, much of the maize grown at the South Cotabato sites relied on seepage from adjacent rice fields rather than on deliberate irrigation.

Although water supplied to the Isabela site was much greater than that required to grow rice and too high to encourage crop diversification, it is unclear whether unattractive market prices also discouraged farmers from growing maize.

Farm-level Irrigation Strategies (Sri Lanka and The Philippines)

Observations show considerable variation in the land-shaping techniques adopted by farmers for irrigating upland crops during the dry season. Large streams of water are needed to wet the soil uniformly but care must be taken to avoid over-irrigating.

Most head-end farmers who obtain sufficient water during the daytime close their outlets during the night and allow more water to pass to the tail-end of the channel. Tail-end farmers who normally receive little water during the daytime then face the difficulty of irrigating at night with larger streams of water than they can easily manage. At both Sri Lanka sites there were cases of severe soil erosion and uprooted plants. Under such conditions, particularly where soils are heavy, it is not only desirable but perhaps essential for farmers to grow rice using the paddy fields as a sink for night irrigation. At Devahuwa it was clear that strategies to deliver water two days in ten proved inadequate for rice except in poorly drained areas. At the Mahaweli site, where irrigation frequencies were higher, rice fared much better.

Results from the Philippines suggest significant differences in the time needed to irrigate land depending on the land-shaping technology selected. The most common form of upland crop irrigation is to flood the basin fields as quickly as possible. Where furrows are used to channel water along rows of plants, irrigation times are reduced but careful land shaping becomes more important.

Agency-level Irrigation Strategies (Sri Lanka and The Philippines)

From our early results emerge several suggestions for improvements that irrigation agencies in both countries might find useful in planning effective irrigation for diversified crops:

- Monitor field-level water conditions, including rainfall.
- Speed up response to dry-season rainfall to avoid damage caused by over-irrigation.
- Communicate changes in water delivery schedules to farmers.
- Modify pre-season planning activities.

Economic Benefits of Crop Diversification in Sri Lanka

To assess the agro-economic constraints to diversified cropping, yield and input data were collected from a sample of farms during the 1985 dry season in those areas of the research sites where water flows were monitored. Rice accounted for 45% of the total crop area of sampled farms in Mahaweli, and 26% of that in Devahuwa. The principal non-rice crop grown was chillies, accounting for 55% and 36% of the area in the two sites, respectively. In Devahuwa, green gram (29%) and soybeans (9%) were also grown.

The non-rice crops were far more profitable than rice in 1985 (Table 1). This reflects both the high price of chillies and low yields of rice. Mean rice yields were only 2.3 tons of paddy per hectare (t/ha) in Mahaweli and 1.3 t/ha in Devahuwa. In Mahaweli, 20% of the sampled farmers growing rice obtained yields of less than 1.0 t/ha. In Devahuwa the comparable figure was 35%. Water stress appears to have been an important cause of the low yields.

Table 1. Average yield and profitability of crops grown on sampled farms in the Sri Lanka research sites. Dry season, 1985.

	Devahuwa		Mahaweli			
	Rice	Chilli	Green Gram	Soybean	Rice	Chilli
No. of farmers	37	41	42	14	64	92
Avg area planted (ha)	0.37	0.47	0.37	0.36	0.35	0.29
Yield (t/ha)	1.3	0.9	0.6	1.4	2.3	1.9
Gross returns (US$/ha)	184	1,013	436	451	331	1,996
Cash production costs (US$/ha)	135	298	148	114	195	477
Net returns to farm resources (US$/ha)	49	715	288	337	136	1,519
Net returns to family labor (US$/man-day)	0.4	5.6	4.1	7.9	2.3	7.8

RESOURCE MOBILIZATION

In 1985 the Institute carried out a regional study on irrigation service fees with support from the Asian Development Bank (ADB). The objective was to review the procedures and rationale of cost recovery in Indonesia, Korea, Nepal, the Philippines, and Thailand, together with a literature review of conditions in other parts of the region. The information obtained will help develop appropriate guidelines and policies for irrigation cost recovery, with specific emphasis on mechanisms to improve irrigation performance.

Frameworks for Evaluating Cost Recovery

Irrigation can be financed through a variety of mechanisms: water pricing based on demand-determined consumption, irrigation service fees assessed with reference to irrigated area, general taxes levied without specific reference to irrigation service, implicit taxation through control of input prices and regulation of the market sector, and supplemental income to an irrigation agency through other revenue-generating activities.

Cost recovery by an irrigation agency is not necessarily an appropriate method for evaluating irrigation financing policies. Policies are dictated by such factors as a government's financial position, its concern with income disparities and investment decisions, as well as its wish to improve irrigation performance. Depending on the policy adopted, attempts to fully recover O&M costs may not be a suitable strategy, and it is possible that, under some conditions, costs should not be recovered through user fees.

Other factors influencing policy include institutional arrangements related to allocating resources for irrigation, provision of irrigation services, collection of revenue, and control of the resources collected. Financial autonomy exists in the irrigation agency when all four functions are combined within it; without this the agency remains financially dependent on the government budgetary allocation process. Where agencies are financially autonomous, there is greater possibility of linking improved irrigation performance to higher cost recovery levels. Financially dependent agencies rarely make this link.

An important issue is whether indirect beneficiaries of irrigation should contribute to recurrent costs. Although it is rare to find cases in which they are assessed, indirect beneficiaries may contribute through taxes that go to the central government. This strengthens the tendency for direct beneficiaries to pay less than the full cost of irrigation services as long as a central allocation of funds is assured.

A second issue is whether cost recovery should cover both recurrent expenditure and capital investment. If farmers are expected to repay some capital costs, then there is rationale for increasing their role in decision-making processes at the planning and construction stages, as well as during system operation. Even if recovery of capital costs is not included, there may be a case for greater farmer involvement in decisions regarding expenditure on O&M, including staffing levels.

Pricing policies and fee collection. There were wide variations in policies and approaches toward cost recovery among the five countries studied. The basic cost recovery mechanism in all five was a flat rate per hectare of irrigated land, assessed by season, with adjustments possible according to crop type. However, some pump systems have higher rates determined in part by the actual cost of pump operation and agency costs.

Flat-rate pricing in gravity irrigation systems does not imply a uniform rate throughout the country. In Thailand and at the tertiary level in Indonesia there is considerable financial auto-

nomy so that individual schemes fix their own rates. The financial autonomy of the National Irrigation Administration (NIA) in the Philippines, however, is characterized by nation-wide uniformity in irrigation service fees for systems managed by NIA, similar to conditions found in the financially-dependent agencies of Nepal and Thailand.

If irrigation service is satisfactory, the benefits derived by farmers are greater than the O&M costs in all five countries, but the balance is insufficient to cover more than a small part of the capital investment. In Korea, a portion of the fee is set aside for capital recovery, though total revenue fails to cover the full cost of O&M. Other countries do not use this type of fee separation.

Korea achieves the highest rate of fee collection -- over 98% -- largely because of the importance attached by agency staff to a 100% target. A similar trend is emerging in the Philippines, where in 1984 the NIA collected about 62% of fees due, reflecting its recent change from financial dependency to autonomous management. In contrast, Nepal collected 20% of fees due because of the agency's unclear committment to that objective and its dependence on central government for its entire budget.

In Korea and Nepal, irrigation fees are assessed in cash. In the Philippines they are assessed in rice but can be paid in cash at the market price for rice. In Indonesia, water-user associations have both cash and in-kind assessments. The primary advantage of a crop-based assessment is a built-in adjustment for inflation.

The relationship between actual O&M costs and the rates set for irrigation service fees varies greatly among the five countries (Tables 2 and 3). Only in the Philippines is the rate set higher than actual O&M costs, but this is balanced by the failure to achieve 100% fee collection.

Table 2. Summary of potential consequences of irrigation financing mechanisms in relation to financing objectives in five Asian countries.

Financing objectives	Institutional context and financing mechanisms						
	Financial autonomy[a/]			Financial dependence[b/]			
	Service fees	Water prices	Secondary income	Service fees	Water prices	Taxes	Implicit taxes
Improve performance							
More efficient operation of irrigation facilities							
□ greater funding for O&M	Y	Y	Y	N	N	N	N
□ greater managerial and financial accountability	Y	Y	N	N	N	N	N
□ greater involvement of water users	Y	Y	N	N	N	N	N
□ More efficient utilization of water	N	Y	N	N	Y	N	N
□ Improve irrigation investment decisions	?	?	N	N	N	N	N
□ Improve fiscal position of government	Y	Y	?	Y	Y	Y	Y
□ More equitable income distribution	?	?	?	?	?	?	?

Y = yes, N = No, ? = unknown; [a/] funds controlled by irrigation agency; [b/] funds controlled by non-irrigation agency or irrigation agency financially dependent on budget allocations.

Table 3. Estimated benefit-recovery ratios under alternative financing policies.[a/]

Country	Policy			
	Actual	Actual modified to equal O&M costs	Actual modified to equal O&M plus full capital cost recovery	
			Moderate	High
Indonesia				
Low estimate[b/]	8	10	56	114
High estimate	21	27	154	313
Korea [c/]				
Low estimate	26 (54)	27 (58)	141 (297)	203 (429)
High estimate	33 (70)	36 (75)	183 (387)	264 (557)
Nepal	5	10	74	122
Philippines	10	7	43	98
Thailand[d/]	9 (30)	31 (53)	155 (176)	279 (300)

[a/] A benefit recovery ratio is the ratio of all increases in direct and indirect farmer payments for irrigation services to the incremental net farm income resulting from irrigation. [b/] Low and high estimates result from alterative estimates of the net benefits of irrigation. [c/] Figures in parentheses represent the estimated benefit recovery ratios that would prevail if domestic prices of rice were allowed to drop to a level consistent with 1983 world prices (estimated to be US$0.276/kilogram), while all other prices and input amounts remained constant. [d/] Figures in parentheses represent the values that would apply if the implicit tax on the farmgate price of rice were 22%.

An important contribution to the viability of an irrigation agency may come from secondary revenue generated through activities outside irrigation services. In Korea, water-user associations can derive income from their own capital, contributing 20% of total revenue. Because of high levels of cost recovery, these associations are increasing their share in the ownership of systems by gradually increasing capital repayments. In the Philippines, secondary income amounts to 60% of actual expenses for O&M. Agencies in the other three countries have no important sources of secondary income.

Cost Reduction. Despite a tendency for agencies to raise fees when income falls below expenditures, efforts to reduce costs have been made in all five countries. Such efforts are often dictated by the central government -- as in Indonesia, Nepal, and Thailand -- when requests for annual appropriations are not met from budget allocations. In the Philippines, the NIA prepares budgets and funds them. With low fee collection rates, secondary income becomes more important as the central government reduces its allocations. Efforts have been made to cut costs through staff reductions. In Korea, the water-user associations are decentralized and generally collect adequate revenue to support O&M costs but are subject to strict government control in preparing budget estimates.

Accountability to users increases as agencies become financially autonomous and as users play a greater role in decision-making. This is well established in Korea and is increasing in the Philippines as water-user associations gain more responsibility for irrigation activities. Accountability of financially-dependent agencies to central government increases as financial rather than managerial responsibility increases.

Relating fees to improved performance. Water pricing per unit of water received is often suggested to improve irrigation system performance because farmers would thereby be discouraged from wasting water. However, pricing water deliveries to individuals is likely to be prohibitive in gravity systems serving large numbers of small farms. In addition to the cost of measuring flows -- a difficult and expensive task in itself -- there are substantial administration costs in reporting, billing, and collecting fees. In gravity systems, pricing is probably effective only when groups of farmers organized at the tertiary level can be served with a single bill. Pump irrigation systems provide the only known examples of successful attempts to price water in the five countries. Flat-rate charges per irrigated hectare do not provide incentives for efficient water management. Because the fee is the same irrespective of how much water is actually used, farmers have an incentive to use all the water they can acquire.

For water pricing to be an effective mechanism, careful control over supply is essential. In many systems such control is problematic, and much wastage of water can be attributed to lack of control rather than excessive demand. Imposition of strict control over supply may lead farmers to adopt the same types of water-saving measures as if water were priced. It appears that most of the potential gains from water pricing could be realized through greater supply control without the imposition of pricing mechanisms.

Farmers' willingness to pay water charges is related to system performance. Recent increases in the percentage of fees collected in the Philippines are related to improvements in managerial performance. The high rate of collections in Korea is in large part due to effective system performance. If the increased involvement of water-user associations in O&M leads to improved service, farmers may be expected to increase the percentage of fees they pay.

Professional Development Program

The Professional Development Program is designed to prepare people from developing countries to take leadership in strengthening irrigation performance through better management, and to support scholars conducting research on conceptual and methodological issues in irrigation management. The program promotes interaction among researchers, irrigation professionals, and policy makers through three complementary activities: workshops, individual training, and training courses.

Workshops

During 1985 the Institute hosted and co-sponsored five workshops. Four were held at Digana Village.

Research Priorities for Irrigation Management in Asia (January). As part of the process to design IIMI's research program, participants discussed ways in which issues could be addressed through selected research activities. It was jointly sponsored by Cornell University and USAID.

Resource Mobilization for Irrigation (June). Professionals in irrigation and economics from different Asian countries met to discuss issues related to financing irrigation as part of the Resource Mobilization studies.

Selected Research Issues in Irrigation Management (July). Participants complemented the January workshop by addressing four topics of importance to IIMI's research program: rapid appraisal techniques, main system management, rehabilitation, and institutional issues.

Irrigation and its Impact on Vector-borne Disease Transmission (October). Co-sponsored with the World Health Organization's Panel of Experts on Environmental Management, this workshop examined vector-borne disease problems in Sri Lanka and the role of irrigation management in vector habitat control.

Irrigation Management for Crop Diversification (September). Co-sponsored with ADB and the Philippines Council for Agricultural Resources Research and Development, and held in Los Banos, Philippines, this workshop discussed research connected with the Institute's program on irrigation management for crop diversification.

Individual Training

IIMI provides individual training through three unique programs: Research Fellowships, Special Awards, and On-the-job training.

Research Fellowships. The Institute supports graduate students at the Masters or Ph.D. level who are doing thesis research. Fellows are selected on the basis of their potential and the relevance of their research to IIMI programs.

Post-doctoral fellowships are offered to those who have completed commendable research on irrigation issues. They are selected on the basis of the complementarity of their research to that of IIMI and their ability to explore in-depth specialized components of the program. 1985 Graduate and post-doctoral fellows are listed below.

POST-DOCTORAL FELLOWSHIPS

Name	Date	Research topic
Dr. Poh-kok Ng	From October 1985	Development of indices of irrigation performance based on field water status data.
Dr. H. Sally	From October 1985	Rehabilitation processes and canal regulation.

DOCTORAL FELLOWSHIPS

Name	Dates	Title of thesis research
O. Zolezzi	Jan - Dec 1985	Comparative study of two methods of water distribution in the Gal Oya Scheme.
R. Cramer	From March 1985	Farmers' management decisions in tank irrigation systems of Sri Lanka.
R. Hechanova	From Oct 1985	Simulation of soil water and root distribution of corn (in the Philippines).

MASTERS FELLOWSHIPS

M. Reyes	From October 1985	The consumptive use of white bean and its tolerances to drought and flooded conditions (in the Philippines).
M. Elkaduwa	From October 1985	Irrigation management practices in Mahaweli System C.
M. Karunaratne	From December 1985	Study of farm-level benefits of irrigation in Mahaweli System H.

Special Awards

Beginning in 1986, this program will identify qualified professionals from national irrigation agencies who have carried out innovative management approaches, and provide them with substantive, computational, and editorial support to write and publish promising research or case study experiences with which they are associated.

On-the-job-Training

In connection with its on-going field research activities, IIMI provides on-the-job training to staff of collaborating irrigation and agriculture agencies. This is already occurring in the Sri Lankan and Philippine research activities, and will be expanded as research activities get underway in other countries.

Training Courses

In May 1985, IIMI co-sponsored, organized, and hosted the World Bank Economic Development Institute (EDI) course on "Planning and Management for Irrigation Projects." The course, lasting six and one-half weeks, was attended by 24 participants from 12 Asian and African countries. Course objectives were designed to improve the knowledge and skills of senior and mid-level officials in planning, evaluating, and managing irrigation systems.

LIST OF 1985 IIMI-EDI PARTICIPANTS IN TH "PLANNING AND MANAGEMENT FOR IRRIGATION PROJECTS" COURSE

M. D. Akkas Ali
Bangladesh Water Development Board
Dhaka, Bangladesh

J. Aung Gam
Ministry of Agriculture and Forests
Myittha, Burma

Myint Maung
Ministry of Agriculture and Forests
Myittha, Burma

J. K. Chahal
Ministry of Irrigation and Power
New Delhi, India

M. Marsoedi Soedjak
The World Bank
Jakarta, Indonesia

Ki Hee Ryu
Agricultural Development Corporation
Seoul, Korea

Hyuk Woo Yoo
Federation of National Farmland Improvement Association
Seoul, Korea

Kok Kam Sand
Federal Land Consolidation & Rehabilitation Authority
Kuala Lumpur, Malaysia

Wong Kok Fiu
Drainage and Irrigation Department
Kuala Lumpur, Malaysia

Shreeram Gautam
National Planning Commission Secretariat
Kathmandu, Nepal

Krishna C. Manandhar
Agricultural Projects Services Centre
Kathmandu, Nepal

Yadab Lal Vaidya
Department of Irrigation, Hydrology,
and Meteorology
Kathmandu, Nepal

Muhammed Hashim-Leghari
Ministry of Food, Agriculture, and Cooperatives
Islamabad, Pakistan

Abdul Ghani Randhawa
National Engineering Services
Lahore, Pakistan

Samuel I. Daguio
Farm Systems Development Corporation
Manila, Philippines

Bienvenido C. Pedregosa
National Irrigation Administration
North Cotabato, Philippines

P. W. C. Dayaratne
Irrigation Department
Colombo, Sri Lanka

Jayantha Jayawardene
Mahaweli Economic Agency
Colombo, Sri Lanka

Siri Medawewa
Ministry of Lands and Land Development
Colombo, Sri Lanka

M. J. Samarasinghe
Ministry of Finance and Planning
Colombo, Sri Lanka

H. Banduratne
Ministry of Finance and Planning
Colombo, Sri Lanka

Abdalla Mohamed El Zubeir
Sudan Gezira Board
Barakat, Sudan

Kuerpan Neanchaleay
Royal Irrigation Department
Bangkok, Thailand

Chaiyuth Sukhsri
Royal Irrigation Department
Bangkok, Thailand.

Information Program

The Information Program's goals are to provide interested individuals and organizations with information on irrigation management, and to encourage the formation of networks for exchanging information. The Communication and Publication Office is responsible for the Information Program and provides facilities to support three main activities: information exchange and networking, publishing, and communication research.

Work during 1985 concentrated on planning and setting up the program, acquiring equipment, and recruiting staff.

Information Exchange and Networking

Plans were made in 1985 to establish an IIMI Library and Documentation Service that would enhance irrigation management activities in developing countries by helping people identify and obtain needed information. The Library serves both as a knowledge resource for staff and visitors, and as a repository of materials for distribution by the Documentation Service. All citations are stored by computer in the Irrigation Management Information Network (IMIN) database.

During 1985 the Library began collecting relevant materials including unpublished and hard-to-get documents. A characteristic of new fields such as irrigation management is that many of the most useful documents are available as unconventional literature which must be collected through personal contact. For this reason, steps were taken to begin building a network through which information might be acquired and shared. Useful materials were donated to IIMI by John Merriam and E. Walter Coward, Jr., as well as by many IIMI staff members. In addition, collaborative agreements were made with three organizations to enable IIMI to quickly obtain a core set of important irrigation materials.

Collaborative Agreements in The Information Program, 1985

Cooperative agreement with Wye College, UK, to assist in preparing an annotated glossary of irrigation terms, and to reproduce and supply library documents from the United Kingdom.

Cooperative Agreement with Centre de Formation Internationale a la Gestion des Resources en Eau (CIFIGRE) in France to provide translation and publication services, with emphasis on serving Francophone Africa.

Memorandum of Understanding with the Overseas Development Institute (ODI) in London to publish jointly for two years the *Irrigation Management Network Newsletter,* to exchange library materials, and to cooperate in setting up a computerized database on irrigation management.

Publishing

The objectives of the publications unit are to provide IIMI with editorial and on-site printing services, and to disseminate Institute publications. Publication activities in 1985 concentrated on editing workshop papers for production by local printers, assembling the mailing list, identifying and ordering printshop and library equipment, and preparing administrative materials for the Institute.

Publications produced in 1985 for general distribution include:

International Irrigation Management Institute. 1984. IIMI: a descriptive brochure (English), Nov.

Small, Leslie E. and R. Barker. 1985. Summary of a Joint IIMI - Water Management Synthesis II workshop on research priorities for irrigation management in Asia. Digana Village, 6-11 Jan. International Irrigation Management Institute Research Report No. 1.

Communication research

The timely communication of relevant information is an important management dimension cutting across each of IIMI's research program areas. As the Institute's research program expands, opportunities will emerge for Information Program staff to participate on the multidisciplinary research teams.

Three additional areas of research are anticipated: 1) Assessing the information needs of IIMI's audience of irrigation managers and researchers, 2) monitoring and evaluating the impact of IIMI's publication dissemination activities on satisfying audience needs, and 3) investigating the communication role of networks in facilitating information exchange.

Papers, Meetings, Consultants

Papers

Cowell, Robert L. 1985. Mailing lists and the dissemination of research publications in IARCs. Paper presented at the Annual Meeting of the CGIAR System Communication Officers, Eschborn, Germany. October.

Groenfeldt, David. 1985. Popluation growth and modernization in North India. Paper presented to the 84th meeting of the American Anthropological Assoc., Washington, D.C. USA. December.

Merrey, Douglas. 1985. The local impact of centralized irrigation control in Pakistan: A sociocentric perspective. Paper presented at the symposium, Lands at Risk in the Third World: Local level perspectives, Institute for Development Anthropology and Clark University Cooperative Agreement on Human Settlements and Natural Resource Systems Analysis, Binghampton, NY, USA. October.

Plusquellec, Herve L. and Thomas Wickham. 1985. *Irrigation design and management: experience in Thailand and its general applicability.* Washington, DC, USA: World Bank Technical Paper No. 40.

Small, Leslie E. 1985. Irrigation management and the financing of irrigation services: Institutional considerations. Paper presented at the seminar on Irrigation Management and Agricultural Development in Sri Lanka. Agrarian Research and Training Institute, Colombo, Sri Lanka. February.

Small, Leslie E. and C.L. Chen. 1985. An approach to estimating the potential benefits from improved irrigation management for rice, irrigation and drainage systems. August.

Wickham, T. (ed) 1985. *Irrigation Management* planning and management, *Span* 29(1):15-17.

Wickham, T. (ed). 1985. *Irrigation Management Research from Southeast Asia.* New York, USA: Agricultural Development Council pub.

Conferences, Symposia, and Workshops Attended.

In addition to active participation in conferences and workshops sponsored by the Institute, IIMI staff attended the following in 1984-85:

Miranda, S.M. *Expert Consultation on Irrigation Water Management,* Yogyakarta, Indonesia, 16-22 July 1984.

Groenfeldt, David. *Region Symposium on Water Resources Policy in Agro-Socio-Economic Development,* Dhaka, Bangaladesh, 4-8 August, 1985.

Rao, P.S. in *Fifth Afro-Asian Regional Conference of the International Commission on Irrigation and Drainage,* Townsville, Australia, 25-30 August 1985.

Miranda, S.M. *Asian Regional Workshop on Monitoring and Evaluation of Irrigation Projects,* Manila, Philippines, 11-16 November 1985.

Ng, Poh-kok and Hilmy Sally. *The Role of Engineers in Agriculture,* Biennial conference and seminar of the Commonwealth Engineers Council and Institution of Engineers, Colombo, Sri Lanka, 15-16 November 1985.

Rao, P.S. *National Seminar on Integrated Command Area Development: Organization and management,* Institute of Command Studies and Irri-

gation Management, Bangalore, India, 14-15 December 1985.

Consultants

The Institute regards the use of highly-qualified consultants as an important and cost-effective means of complementing the capacity of its relatively small staff. Some of these consultants are expected to contribute to IIMI programs on a recurring basis. The consultancies completed during 1984 and 1985 are as follows:

Jul-Aug 1984	R.L. Cowell	Preparation of IIMI descriptive brochure.
Aug 1984	P.A. Cooper	Administrative and Financial Recommendations.
Nov-Dec 1984	R.W. Cummings D.C. Taylor N. Tapay J. Wolf	Recommendations for establishment of collaborating and participating unit of IIMI in Pakistan
Nov-Dec 1984	I. Carruthers R. Chambers M. Moore	Assessment of rapid appraisal for IIMI
Nov-Dec 1984	C. Abernethy A. Waldstein	Exploratory mission to four East African countries
Jan-Jun 1985	M. Moore B. Wallach	Regional survey on institutional issues in irrigation management
Apr-Aug 1985	J. Wolf	Recommendations for the establishment of IIMI Pakistan
Jun-Jul 1985	R.W. Cummings G. Diemer R. Halvek G. Manuellar J. Verdier	Exploratory mission to four West African countries
July 1985	I. Carruthers R. Chambers M. Moore	Co-organizers of workshop on four topics
Sept-Dec 1985	Jane Johnson	Database and documentation system
Jun-Dec 1985	R.Z. Cowell	Development of personnel policies for IIMI

IIMI Headquarters Facilities

The Institute's Headquarters is located at Digana Village, 14 kilometers east of Kandy in the central highlands of Sri Lanka. The Village was built in 1980 as the resident camp for the Victoria Dam and Hydroelectric Project, a part of the Accelerated Mahaweli Development Scheme, which was largely completed in 1985. During 1985, Digana Village was administered and maintained by the major contractor on the Victoria Project, but in 1986 IIMI expects to take on administrative responsibility for the Village.

In early discussions, the Government of Sri Lanka offered IIMI the use of both office facilities and residences in Digana Village. This generous offer has reduced markedly both the start-up time and capital outlay in getting IIMI's programs underway. The Village's central location in Sri Lanka, infrastructure, climate, and scenic surroundings offer the staff and participants an ideal setting for research and training activities.

The Village is a self-contained community divided into four zones: residential, commercial, recreational, and IIMI Headquarters. The residential area contains 210 houses, of which 80 have been earmarked for IIMI. The remainder are occupied by members of government agencies. Fire, sanitary, and security services are provided, and the Village has its own water supply.

Commercial facilities include shops, supermarket, post office, and bank. There is also a clinic with outpatient services available to all Village residents, and an elementary school with a 1985 enrollment of 40 pupils.

Recreational facilities include a swimming pool, tennis courts, squash court, playing field, and facilities for indoor sports. Adjacent to these is a guest house with 12 rooms, a restaurant seating 75 persons, a snack bar, and several function rooms.

Plans were begun in 1985 to construct a headquarters building for IIMI in the Village. This will be financed and built by the Government of Sri Lanka as part of its contribution to the establishment of IIMI. The Institute is presently using as temporary offices the major part of a 50-room dormitory complex which will be used to accommodate trainees when permanent offices are built.

Staff

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Mr. Michael Jones
Director of Administration

Ms. J. Cramer
Personal Assistant to the DG
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Senior Program Staff

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Agricultural Engineer
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Dr. Robert Cowell
Coordinator, Information Program
Sri Lanka

Dr. David Groenfeldt
Economic Anthropologist
Sri Lanka

Dr. Edward Martin
Agricultural Economist
Sri Lanka

Dr. Douglas Merrey
Social Scientist
Sri Lanka

Dr. Senen Miranda
Agricultural/Civil Engineer
Sri Lanka

Dr. C. R. Panabokke
Agronomist
Sri Lanka

Dr. P. S. Rao
Systems Scientist
Sri Lanka

Dr. Leslie Small
Agricultural Economist
Sri Lanka

Dr. Donald Taylor
Acting Resident Scientist
Indonesia

Dr. Alfredo Valera
Agricultural Engineer
Philippines

Dr. Robert Yoder
Agricultural Engineer
Nepal

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T. K. O. Bahar
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A. Boudwyn
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M.B. Fernando
Accounts Assistant

C.V. Gale
Headmaster

M. Gale
Teacher

H. K. Gamini
Assistant Accountant

K. A. Hemakeerthi
Research Assistant

H. M. Hemakumara
Research Assistant

C. Kariyawasan
Secretary

R. Lay
Purchasing Officer

P. Molligoda
Secretary

R. Moragoda
Research Assistant

D. Nugawela
Secretary

S. Paragahawewa
Secretary

A. Perera
Secretary

K. C. S. Perera
Maintenance Officer

M. L. Perera
Secretary

N. Ramanayake
Secretary

E. Ratnasiri
Project Assistant

V. Samarawickrema
Secretary

E. Scharenguivel
Secretary

S. Tharmarajah
Teacher

S. Weerasekera
Secretary

S. Weerasinghe
Secretary

Financial Statement

Ernst & Whinney

Chartered Accountants

OFFICERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

454/3, PIACHAUD GARDENS
KANDY, SRI LANKA

Telephone : 08-24244
Cables : ERNSTAUDIT, KANDY

REPORT OF THE AUDITORS TO THE BOARD OF GOVERNORS OF THE INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE

We have examined the financial statements of the International Irrigation Management Institute for the period ended December 31, 1985.

Our examination was made in accordance with generally accepted auditing standards. We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for purposes of our audit.

The Institute's financial statements are prepared mainly on the basis of accounting practices adopted by International Agricultural Research Centres seeking assistance from support groups, which practices differ in some respects from generally accepted accounting principles.

In our opinion, so far as appears from our examination, proper books of account have been maintained by the Institute and, to the best of our information and according to explanations given to us, the said financial statements which are in agreement therewith, together with the notes referred to therein give a true and fair view of the state of affairs of the Institute as at December 31, 1985 and the results of its operations for the period ended on that date.

Ernst & Whinney

Chartered Accountants

April 30, 1986.

PARTNERS: M.T.L. FERNANDO F.C.A., T.K. BANDARANAYAKE B.Sc. F.C.A.
K.H.K. WIJYADASA F.C.A.

FINANCIAL STATEMENT

The Institute receives support from a wide range of donors through its Support Group and from other contributors on a bilateral basis. Funds have been received from the following donors during the period from IIMI's inception through the end of 1985:

	1983 US$	1984 US$	1985 US$
Unutilized funds brought forward from 1983		82,068	
UNRESTRICTED CORE SUPPORT			
Aga Khan Foundation		75,000	100,000
Asian Development Bank	30,000	200,000	270,000
Australia	57,660	45,120	56,345
Ford Foundation	50,000		1,500,000
France	25,974	42,282	53,476
General Services Fund		25,000	15,000
Japan			29,127
Rockefeller Foundation	50,000	53,000	50,000
United Kingdom		65,400	135,456
USA		200,000	250,000
UNDP	20,000	30,000	
Less unutilized funds carried forward	(82,068)		(500,000)
	151,566	817,870	1,959,404
SPECIAL PROJECT SUPPORT			
ADB: Philippines			250,000
ADB: Indonesia			350,000
ADB: Regional Studies			100,000
Ford Foundation: West Africa			25,000
Ford Foundation: Nepal			90,000
Ford Foundation: India			50,000
World Bank (IIMI-EDI Workshop)			19,140
UNDP (Workshop)			30,000
Less funds applicable to 1986			(590,184)
	151,566	817,870	2,283,360
Other income		1,006	28,530
TOTAL INCOME	151,566	818,876	2,311,890
APPLICATION OF FUNDS			
Pre-incorporation expenditure	151,566		
Restricted & unrestricted			
Core operations		596,875	1,969,299
Capital (Non-expendable)	172,001	272,591	
Working capital		50,000	70,000
TOTAL APPLICATIONS	151,566	818,876	2,311,890

International Irrigation Management Institute Digana Village - Via Kandy
Statement of Assets, Liabilities and Fund Balances December 31, 1985

ASSETS	1984 US$	1985 US$	LIABILITIES & FUND BALANCES	1984 US$	1985 US$
Cash	46,625	865,778	Liabilities		
			Accounts payable	107,811	73,663
Accounts receivable:					
From donors	220,342	777,607	Grants applicable to succeeding years		1,090,184
From international staff	4,193	43,146			
From local staff	18	9,737			
Other international receivables	1,969	30,732	FUND BALANCES		
Prepaid expenses	16,816	89,642	Investment in non-expendable assets	172,002	444,593
Advances to projects		63,422	Core operations	132,151	596,216
Property and equipment	172,001	444,592	Working capital	50,000	120,000
			Capital	-	
	461,964	2,324,656		461,964	2,324,656