



IIMI

ANNUAL REPORT 1986

INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE

Support for IIMI is provided by members of the *IIMI Support Group*. During 1986, IIMI donors included the Aga Khan, Ford, General Services, and Rockefeller Foundations; the Asian Development and World Banks; the International Fund for Agricultural Development; the Rockefeller Brothers Fund; the United Nations Development Programme; and the national governments of Australia, France, Japan, Netherlands, United Kingdom, and the United States of America. The governments of Sri Lanka and Pakistan provided facilities and additional in-kind support for IIMI, and the governments of Indonesia, Nepal, and the Philippines provided program support for IIMI-related activities in those countries.

Citation:

IIMI pub 87-04

International Irrigation Management Institute. 1987. Annual report for 1986. Digana Village, Sri Lanka. August.

/ research institutes - irrigation management - planning / policy - financial planning - developing countries -

DDC 631.76

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ISBN 955-579-001-9

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1986 Board of Governors

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Preface

Five years ago, representatives of fifteen international donor agencies formed a Support Group to promote the establishment of the International Irrigation Management Institute (IIMI). They viewed IIMI as the most promising and cost effective way to build a critical mass of experienced professionals who could serve as a resource for research and training to help developing countries improve irrigation performance through improved irrigation management. The Support Group also recognized that an international institute could complement efforts at the national level by addressing irrigation management issues at a global, multi-disciplinary, and multi-faceted level.

Today, thanks to the vigorous work of IIMI's Support Group, its Board, and, in particular, its staff and first Director General, Dr. Thomas Wickham, the Institute is firmly established and beginning to produce results of value to irrigation agencies in developing countries.

As highlighted in the pages that follow, IIMI has attracted a first class team of professionals drawn from various disciplines, and has posted them in five Asian countries to date. Working collaboratively with national agency clients, they have initiated research that ranges from identifying management practices for improving the performance of government-administered irrigation systems to finding better ways for agencies to assist farmer-managed irrigation systems. To encourage adoption of management innovations resulting from this research, IIMI has set up a program to help developing countries prepare key individuals for leadership roles in improving irrigation management. And to provide a resource base of information about improved irrigation management and encourage communication of ideas, IIMI has produced a variety of documents and established an information exchange program. To broaden the base of IIMI's research and extend its results to Africa, steps have been taken toward a long term strategy for activities on that continent. IIMI is now at a take-off point, a point where the Institute is ready to help strengthen national efforts to improve and sustain performance of irrigation systems by developing and disseminating management innovations.

In looking toward the future, my colleagues and I are very conscious of the challenges we face in fulfilling our potential. We are challenged to focus on activities that will concentrate

our resources on a limited set of important issues where we have a comparative advantage. We are challenged to properly support and backstop our international programs and meet our program goals, despite the intervening distances and communication difficulties. And we are challenged to develop a solid base of long-term financial support. We are confident, however, that with the goodwill and support of the international donor community, our partner institutions, and our client irrigation agencies in developing countries, we will successfully meet these challenges and fully achieve our important mission.

Roberto Lenton
Director General

Note: Roberto Lenton became IIMI's Director General in June, 1987, following the retirement of Thomas Wickham.

1986 Highlights

During 1986, IIMI fielded 20 international staff with necessary support staff at its Headquarters in Sri Lanka, at its branch in Pakistan, and at its participating country units in the Philippines, Indonesia, and Nepal. Activities were initiated and developed in IIMI's Research, Professional Development, and Information Programs.

The Research Program

IIMI initiated research in three program areas -- Systems Management, Rehabilitation and Improvement for Management, and Farmer-Managed Irrigation Systems.

In *Systems Management*, IIMI:

- carried out research in Sri Lanka, the Philippines, and Indonesia to identify the technical and socio-economic constraints to effective irrigation management for diversified cropping in rice-based systems. The results were disseminated to other Asian countries at the international workshop, "Irrigation Management for Crop Diversification," hosted by IIMI in October at its Headquarters, and via reports to the Asian Development Bank.
- concluded a study in Pakistan regarding the impact on water distribution of lining distributary canals. In late 1986, the results were presented to the Punjab Irrigation Department, which requested the study.
- concluded its study on mobilizing financial and human resources to support the costs of irrigation system operations and maintenance (O&M) in Indonesia, Korea, Nepal, the Philippines, and Thailand. In July, IIMI presented results and recommendations in a seminar to senior irrigation officials from 13 Asian countries at the Asian Development Bank's Headquarters in Manila.
- conducted extensive research on the behavior of farmers and farmer-agency interactions in Indonesia, Sri Lanka, and the Philippines.
- began testing a field-level methodology for measuring the adequacy and equity of water distribution in lowland rice irrigation systems. Indices were developed for measuring the frequency, duration and intensity of water stress. These indices were correlated with yield data from Indonesia and the Philippines.



Varying soil moisture is one of many constraints to effective irrigation management for non-rice crops.

"IIMI initiated research in three program areas -- Systems Management, Rehabilitation and Improvement for Management, and Farmer-Managed Irrigation Systems."



If improperly managed, rehabilitation projects begin to deteriorate soon after completion.

“... collaborated with the Water and Energy Commission Secretariat in the inventory of 152 irrigation systems along Nepal’s Indrawati River basin.”

- co-sponsored two major workshops; “Participatory Management in Sri Lanka’s Irrigation Schemes” (with the Ministry of Lands and Land Development, Sri Lanka) in Digana in May and “Social Science Perspectives on Managing Agricultural Technology” (with the Rockefeller Foundation) in Lahore in September.

In Rehabilitation and Improvement for Management, IIMI:

- defined objectives and strategy for the newly formed program area, explored potential research sites, prepared research proposals, and initiated documentary and field research.
- developed an analytical framework to test the sustainability of rehabilitation projects.
- began research on a rehabilitation project in Sri Lanka to improve its water use efficiency and equity.
- concluded a case study of Sri Lanka’s Tank Irrigation Modernization Project and presented a report of results in October at the international conference on “Irrigation System Rehabilitation and Betterment” held in Washington D.C.

In Farmer-Managed Irrigation Systems (FMIS), IIMI:

- identified FMIS research issues and initiated the International FMIS Research Network at an international conference on “Public Intervention in Farmer-Managed Irrigation Systems,” co-hosted by IIMI and Nepal’s Water and Energy Commission Secretariat in Kathmandu in August.
- collaborated with the Water and Energy Commission Secretariat in the inventory of 152 irrigation systems along Nepal’s Indrawati River basin.
- fielded two reconnaissance missions to the Tarai of Nepal to evaluate and plan research on its large farmer-managed systems.

The Professional Development Program

During 1986, the Program conducted workshops and

conferences, training courses, individual training, and research. In these areas, IIMI:

- organized and conducted five international workshops and conferences.
- organized and hosted in June/July the 6-week course on "Planning and Management of Irrigation Schemes in Asia and Africa" in cooperation with the World Bank's Economic Development Institute.
- supported three Post-doctoral Fellows in Sri Lanka, one in Indonesia, and one in Pakistan; two Doctoral Research Fellows in Sri Lanka, one in the Philippines, one in Nepal, and one in Indonesia; and one Master's Degree Fellow in the Philippines and one in Sri Lanka.
- initiated the Special Awards Program whose first recipient was an irrigation manager from the Magat River Irrigation Project in the Philippines.
- concluded research on training programs in Sri Lanka's irrigation agencies. The results and recommendations were reported to officials from Sri Lanka's irrigation-related ministries.



A Nepal farmer refers to a traditional waterclock to time rotational distribution. When the smaller bowl fills with water and sinks, one unit of time has passed. The transition from traditional to modern management practices must be carefully considered.

The Information Program

The Program focussed on publishing and supporting the Institute's information exchange and networking activities. In 1986, IIMI:

- designed a computerized bibliographic database and added to it nearly 2,000 citations of irrigation management material.
- set up a prototype computer network among IIMI Headquarters, the Overseas Development Institute (ODI), and IIMI-Indonesia to make the information contained in the database readily available to researchers.
- organized a specialized library and continued to identify, collect, and process materials on irrigation management and related topics.
- continued to equip, supply, and train its publication



Irrigated agriculture in Africa has significant potential for increasing food production and rural employment

“... established collaborative agreements with the International Rice Research Institute (IRRI) in the Philippines, and the International Food Policy Research Institute (IFPRI) in the United States.”

unit, which published 15 titles and disseminated 15,000 copies to a mailing list of 2,093 addresses in 114 countries. Two publications were translated into French, published, and disseminated in French-speaking Africa.

- signed agreements with ODI to jointly publish during the year three issues of the *ODI-IIMI Irrigation Management Network Newsletter*; and with the International Commission for Irrigation and Drainage (ICID) for collaboration in library, database, and publishing activities.

Other Activities

The Institute significantly expanded contact with its international network of irrigation professionals and researchers, thereby increasing the demand for its services. During 1986, IIMI:

- signed Memoranda of Agreements with the national governments of Pakistan and Nepal.
- established collaborative agreements with the International Rice Research Institute (IRRI) in the Philippines, and the International Food Policy Research Institute (IFPRI) in the United States.
- cooperated in research and training activities with nine national irrigation agencies and research institutions.
- sent exploratory missions to Bangladesh and India to prepare the groundwork for collaborative research to strengthen the capacity of national agencies to improve irrigation performance.
- prepared “An Africa Strategy for IIMI” that culminated the results of several exploratory missions during 1984-85. The document identified nine potential sites for IIMI operations, from which IIMI’s Board of Governors selected Sudan, Morocco, and West Africa for initial activities.

International Irrigation Management Institute

The International Irrigation Management Institute is the first international institute whose efforts are devoted solely to the subject of irrigation management in the developing world. Its mandate is to strengthen national efforts to improve and sustain the performance of irrigation systems. It does this by identifying, developing, and disseminating improved irrigation practices and methods.

IIMI's establishment in Sri Lanka in 1984 was promoted by a group of international donors who became members of the IIMI Support Group. IIMI's supporters during 1986 included the Aga Khan, Ford, General Services, and Rockefeller Foundations; the Asian Development and World Banks; the International Fund for Agricultural Development; the Rockefeller Brothers Fund; the United Nations Development Programme; and the national governments of Australia, France, Japan, Netherlands, United Kingdom, and United States of America. The governments of Sri Lanka and Pakistan provided facilities and additional in-kind support for IIMI, and the governments of Indonesia, Nepal, and the Philippines provided program support for IIMI-related activities in those countries.

IIMI works most effectively with two sets of client or partner institutions: irrigation agency and research and training institutions. The needs of its clients/partners are met through the immediate output of research, through such by-products of research or training activities as the development of research methodologies or performance monitoring techniques, and through the broad dissemination of information.

The design and implementation of IIMI's program activities follow seven principles: a problem orientation; integration of research, training, and information activities; close interaction among IIMI programs in different countries; collaboration with clients/partners; a multi-disciplinary perspective; a whole-systems approach; and the use of irrigation systems as field laboratories.

IIMI's Research Program is dynamic and evolves in response to the needs of clients/partners in developing countries. Research projects are organized in three areas. Projects in the *System Management* area develop and evaluate irrigation management practices that improve the performance of irrigation systems controlled by project authorities or irrigation agencies. Projects in the *Rehabilitation and*

"The International Irrigation Management Institute is the first international institute whose efforts are devoted solely to the subject of irrigation management in the developing world."



Research in the Farmer-Managed Irrigation Systems Program Area is carried out in geographically isolated areas where rural poverty is severe.

“IMI’s interest lies in improving the processes involved in managing irrigation for productive agriculture, resulting in higher yields, better and more equitable use of resources, and a better life for rural communities.”

Improvement for Management area develop and evaluate design and rehabilitation approaches that will enhance manageability and thus improve and sustain the performance of irrigation systems. Projects in the *Farmer-Managed Irrigation Systems* area develop and evaluate effective intervention strategies to assist large and small irrigation systems that are managed by farmers.

IMI’s research feeds directly into its Professional Development Program. The program prepares irrigation practitioners from developing countries for leadership roles in strengthening irrigation performance through better management. The program is carried out through five complementary activities: workshops and conferences, training courses, individual training, on-the-job training, and research.

IMI’s Information Program provides individuals and organizations with the information they need on irrigation management and related issues. This is achieved through information exchange and networking, and publishing.

The Institute currently operates with a small headquarters in Sri Lanka and cooperating units in the Philippines, Indonesia, Nepal, and Pakistan. Criteria for selection of country programs include strong country interest, significant opportunities for impact on irrigation performance, and assurance of effective working arrangements.

Thus IMI, in association with collaborating national agencies and concerned irrigation managers and researchers, seeks to improve irrigation performance in the developing world. Its interest lies in improving the processes involved in managing irrigation for productive agriculture, resulting in higher yields, better and more equitable use of resources, and a better life for rural communities.

Geographic Scope

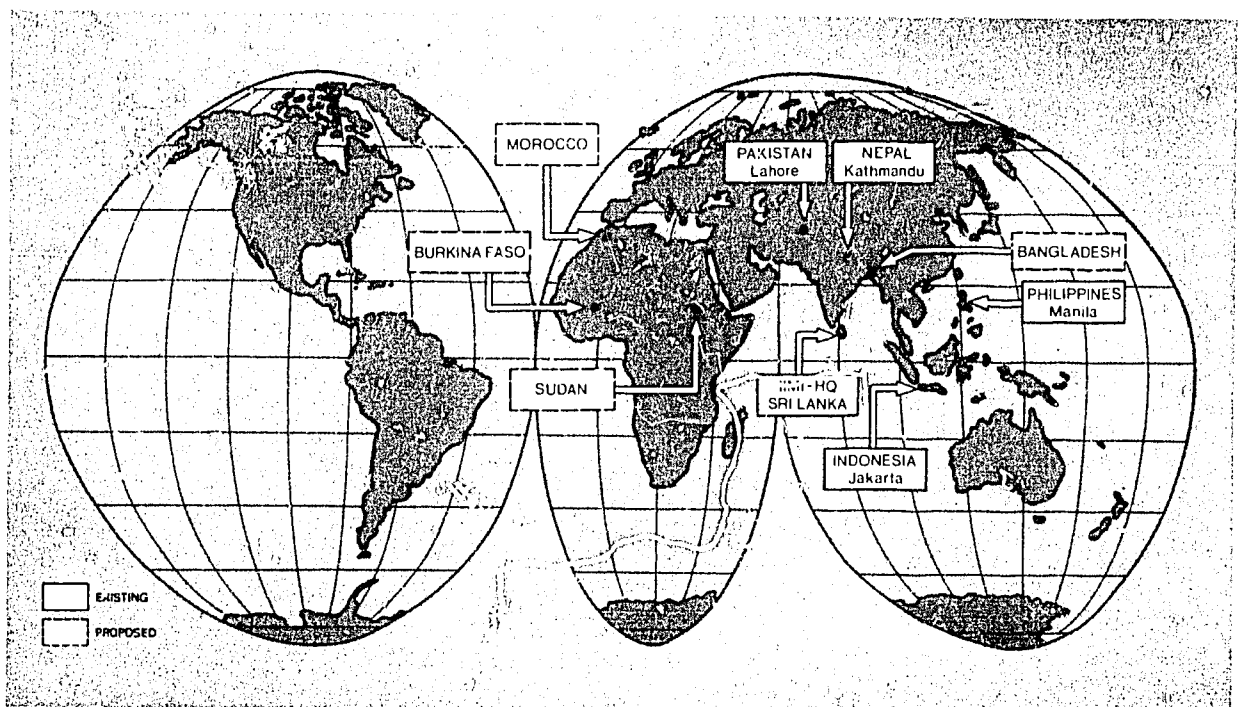
As originally conceived by the Institute's founders, IIMI operates through a small Headquarters unit and a number of cooperating units strategically located near important irrigation sites in the developing world. All of IIMI's research activities are formulated as one core program and carried out where the objectives of each activity can be most easily met. In 1986, activities were initiated or continued in Sri Lanka and four other Asian countries: the Philippines, Indonesia, Nepal, and Pakistan. Plans were made to expand activities to include Bangladesh, India, and various countries of Africa.

Asia

The greatest portion of IIMI's work is currently conducted in Asia because of the importance of irrigation to that region, particularly South and Southeast Asia. A brief background of each of IIMI's current and prospective programs and collaborating institutions in Asia follows.

Sri Lanka. Sri Lanka was chosen as the location of the Institute's Headquarters because of the proximity of Sri Lanka to the "center of gravity of the irrigation world." Sri Lanka offers many other advantages, including access to various types of irrigation systems, excellent living facilities for attracting and holding expatriate staff, and the strong interest

"Sri Lanka was chosen as the location of the Institute's Headquarters because of the proximity of Sri Lanka to the center of gravity of the irrigation world."





Mung bean is an important irrigated non-rice crop during the dry season in Sri Lanka. Sri Lanka began promoting non-rice cropping in irrigated areas some 15 years ago.

and willingness of the Government to accord the Institute appropriate privileges and immunities.

IIMI's research in Sri Lanka is conducted at a site in the North Central Province containing three irrigation systems, and a site in the Southern Province comprising two relatively large irrigation projects and several farmer-managed irrigation systems. Collaborative agreements have been signed with the Post-graduate Institute of Agriculture of the University of Peradeniya, the Agrarian Research and Training Institute (AR&TI), the Mahaweli Authority, and the Ministry of Lands and Land Development. Research staff also receive guidance from the IIMI-Sri Lanka Consultative Committee, whose members are drawn from the higher levels of the Government of Sri Lanka.

The Institute's work in Sri Lanka provides exposure to diverse local irrigation systems and their management agencies, and gives research staff at Headquarters the opportunity to maintain direct involvement with field studies close to home. In addition, researchers at Headquarters are responsible for participating in IIMI's country programs (where IIMI works without resident staff), and for "backstopping" researchers working in IIMI's cooperating units. IIMI's Headquarters staff coordinate activities for devising and implementing a broad spectrum of action research strategies. Such activities can range from preparing and monitoring research proposals to coordinating a research network, to ensuring that results are disseminated to irrigation agencies and professionals throughout the developing world.

Funding for Headquarters' activities in 1986 was provided by donor members of IIMI's Support Group through Core Budget and Special Project funding.

The Philippines. During 1986, IIMI's research in the Philippines was conducted by a Resident Scientist and a Post-doctoral Research Fellow. Additional staffing requirements were met through contract and cooperative agreements with universities and with national and regional research institutions. Research was carried out at three sites in Mindanao, at two sites in central Luzon, and at three sites in the Bicol region of Luzon. Collaborative agreements exist with the National Irrigation Administration (NIA), which assists with data collection, and with the International Rice Research Institute (IRRI). Guidance is provided by a national advisory committee.

In 1986, IIMI's activities in the Philippines were partly financed by the Asian Development Bank (ADB).

Indonesia. IIMI's 1986 research activities in Indonesia were directed by a Resident Scientist and a Post-doctoral Research Fellow, and benefitted from the contributions of 16 irrigation staff seconded by the Directorate-General of Water Resources Development, IIMI's partner agency in Indonesia. Research was conducted in three irrigation projects in East, Central, and West Java. Overall guidance was provided by a committee chaired by the Secretary General of the Ministry of Agriculture and Food Crops.

In 1986, Indonesian activities were principally financed by ADB and the Ford Foundation.

Nepal. IIMI's Nepal team included two Resident Scientists and one Doctoral Research Fellow. Research was carried out in the Indrawati Basin, in the hills of the Western Development Region, and in the Tarai. In addition to their work in Nepal, the Resident Scientists spend part of their time in countries with similar geographical conditions, such as Bhutan and the northern parts of India, Pakistan, and Thailand. A Memorandum of Understanding was signed on 3 January 1986 with the Nepal Water and Energy Commission Secretariat (WECS).

In 1986, the Nepal program was primarily financed by the Ford Foundation and the International Fund for Agricultural Development (IFAD).

Pakistan. During 1986, IIMI-Pakistan, an IIMI Branch unit, was staffed by a Director, an interim Director of Administration, and two senior scientists plus relevant support staff. IIMI-Pakistan Headquarters is in Lahore, and field sites are located in Punjab and provisionally in the Sind provinces. A Memorandum of Agreement signed on 28 September 1986 with the Government of Pakistan provides the necessary framework for the unit's work. Collaborative agreements were established shortly thereafter with the irrigation and agriculture departments of the major provinces.

In the future, this unit will have a slightly larger organizational and geographic scope than other cooperating units, reflecting its important location in relation to irrigation in Asia's arid and semi-arid regions.



IIMI's research in Indonesia is a collaborative effort with the Directorate General of Water Resources Development, which seconded 16 irrigation staff to the project for 1986.



Waterlogging and salinization are a critical problem in Asia's arid and semi-arid regions. This is one of many issues that IIMI-Pakistan is working on.



IIMI is exploring collaborative research projects with several Indian institutions engaged in irrigation management research in India.

In 1986, funding was provided by a grant from IFAD and support from IIMI's Core Budget.

Other Asian activities. During 1986, IIMI explored possible collaborative projects in Bangladesh and India, two other Asian countries where irrigation is crucial to development.

In Bangladesh, an IIMI mission established the need for a project to look at groundwater-based irrigation systems managed by farmers and at large-scale surface water irrigation systems managed by agencies. Research in Bangladesh could be conducted by a Senior Resident Scientist, probably based in Dhaka. The Bangladesh Agricultural Research Council (BARC) has indicated its strong support for such a project. In India, IIMI researchers are exploring potential collaborative projects with several Indian institutions engaged in irrigation management research, training, and information exchange.

Africa

Although IIMI has concentrated its initial research in Asia -- which includes most of the developing world's irrigated agriculture -- several African countries have expressed interest in becoming part of the Institute's world-wide activities. Well-managed irrigation clearly has potential for increasing food production and generating employment opportunities on that continent. IIMI recognizes, however, that research in Africa will require strategies that differ significantly from those currently employed in Asia.

For those reasons, the Institute's Governing Board and staff have given considerable thought to how IIMI could work most effectively in Africa. In 1985, two IIMI missions visited Africa, and in January 1986, IIMI prepared its first strategy paper for Africa. A workshop was held in Ouagadougou in February to discuss this paper with prospective partner institutions. In June, the Institute's Board approved the placement of resident staff in offices in Sudan and Morocco, and in a small regional office in West Africa to support national programs in Sahelian West Africa. Selection of locations was based on several criteria, including the

extent of existing irrigation, anticipated food production deficit, communication links with neighboring countries, political and institutional stability, and the existence of irrigation institutions with which IIMI could collaborate.

As in Asia, IIMI's activities in Africa are expected to include field research, professional development, and information exchange. Research will focus on issues such as how best to develop and manage irrigation under serious labor constraints, how to integrate irrigated and rainfed agriculture, and how to improve and expand Farmer-Managed Irrigation Systems.

At the end of 1986, IIMI had made important progress in effectively establishing and carefully formulating its proposed activities in Morocco, Sudan, and West Africa.

Papers Prepared, Presented, or Published

The following reports relate to IIMI's activities in various countries:

Abernethy, C. L. and D. Berthery. 1986. *An Africa strategy for IIMI*. Digana Village, Sri Lanka: International Irrigation Management Institute.

International Irrigation Management Institute. 1986. *Second exploratory mission to Africa*. Digana Village, Sri Lanka.

International Irrigation Management Institute. 1986. *Final report for study on irrigation management for crop diversification*, Prepared for the Asian Development Bank (Technical Assistance Agreement 654). Digana Village, Sri Lanka.

International Irrigation Management Institute. 1986. *Study of irrigation management (Indonesia): Inception report*. Prepared for the Asian Development Bank (Technical Assistance Agreement 673 INO) and the Government of Indonesia. Digana Village, Sri Lanka.



IIMI staff met with irrigation agency officials and farmers in nine African countries during 1985 and 1986. Plans are in progress to begin activities in Sudan, Morocco, and West Africa in 1987 and 1988.

“As in Asia, IIMI’s activities in Africa are expected to include field research, professional development, and information exchange.”



Research Program: Systems Management

Beginning in the early 1950s, development agencies and national governments invested heavily in building and expanding irrigation systems. Irrigation development was seen as having the potential to produce various combinations of greater food production, greater rural income, higher rates of employment, more export earnings, and lower internal food prices. However, as attention turned in the early 1970s to the benefits of those investments, it became apparent that performance objectives were not being met. Irrigation efficiencies of 30 percent were common, access to the newly created resources was inequitable, and cost recovery was declining rapidly.

The major objective of IIMI's Systems Management Program, the largest of its three research program areas, is to develop solutions to these problems of poor performance. This means first developing a conceptual and theoretical basis for a better understanding of irrigation system problems; second, producing practices, methods, and organizational reforms which can be used by irrigation agencies to improve system performance; and third, providing specific answers to problems relevant to specific contexts.

During 1986, IIMI researchers worked within four project areas: 1) Irrigation Management for Crop Diversification; 2) Resource Mobilization; 3) Irrigation Institutions; and 4) Performance Monitoring and Evaluation. However, as with all of IIMI's activities, staff worked in an interdisciplinary fashion, approaching each activity as a unit rather than as individuals in separate disciplines. It is the focus on *management processes* that characterizes all the above research activities, and integrates them into a coherent program.

Irrigation Management for Crop Diversification

As a result of improvements in rice production technologies during the last two decades, many countries of the humid tropical regions of Asia are approaching self-sufficiency in rice production, which in turn has led to declining real prices of rice. As a consequence, major policy shifts are occurring in these countries to minimize the underutilization of land, to optimize the use of irrigation resources and increase agricultural productivity, and to achieve self-sufficiency in non-rice crops, especially those with import substitution potential -- all of which have resulted in policies that promote crop diversification.



An IIMI research assistant interviews two farmers in IIMI's field sites in Sri Lanka's North Central Province.

“IIMI researchers in association with national agencies collected two years of data on how selected irrigation systems are managed in Sri Lanka, the Philippines, and Indonesia.”

At the same time many Asian farmers are seeking ways to diversify their production and income sources. But they face obstacles in growing non-rice crops on irrigation systems that were designed and have been operated for rice. Because irrigation of non-rice crops requires an intermittent flow of specific quantities of water, better control of the irrigation system is necessary if farmers are to diversify their cropping patterns.

Since 1985, IIMI has worked to identify the technical and socio-economic constraints to effective irrigation management for diversified cropping in irrigated areas and to suggest ways to mitigate these constraints. IIMI researchers in association with national agencies collected two years of data on how selected irrigation systems are managed in Sri Lanka, the Philippines, and Indonesia. These data include timing and quantity of water flows, and resulting water adequacy at different points within the system; costs and returns of various crops; levels of farmer-agency interaction; records of farmers' irrigation practices and decision making processes; and descriptions of agency management procedures and constraints.

Data collection, analysis, and recommendations to improve irrigation performance constitute Phase I research in all three countries. Phase II is an action research stage to synthesize results and, in collaboration with agencies and farmers, pilot test the improved practices recommended during Phase I.

In **Sri Lanka**, staff documented and compared the management practices of two systems managed by different agencies. In the past decade, irrigating non-rice crops during the dry season has been incorporated into design and management policies of the Sri Lankan irrigation agencies. This is probably why IIMI found in one of these systems a good basic knowledge of irrigation management for diversified crops during the dry season.

In these same systems, however, researchers observed that efficiency of water delivery diminishes at the turnout level. This could be ascribed to design weakness, communication gaps, inadequate operations and maintenance, and lack of performance monitoring or evaluation -- all impairing efficiency and equity. A marked inequity in water deliveries to farm allotments within a single turnout, unreliability in supplying irrigation water at the turnout and tail ends, variable

soil drainage conditions, inequitable access to credit, and variable farm gate prices were also observed in these systems.

In the **Philippines**, IIMI researchers found abundant information on the production technology of non-rice crops, but, in contrast to Sri Lanka, a lack of information and few guidelines on effective irrigation management for dry season production of non-rice crops. The Government of the Philippines has only recently begun encouraging dry season irrigation of non-rice crops. The crop diversification that is found in the Philippines is primarily that of the private sector contracting for cash crops.

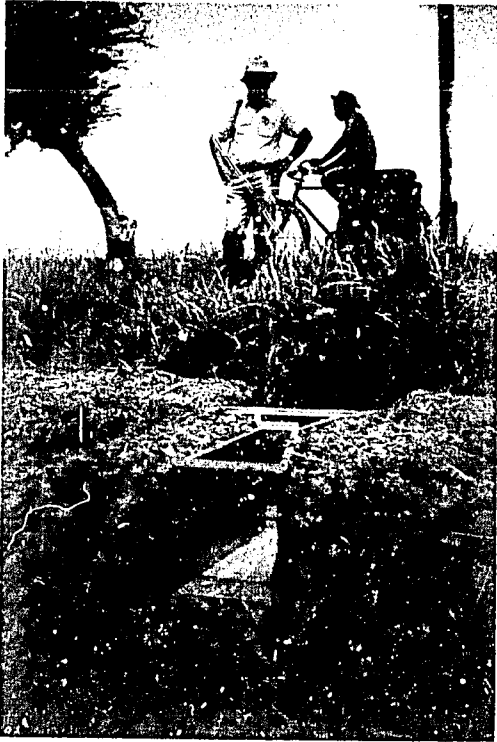
Thus, IIMI concluded that existing system and farm level practices in the Philippines evolved through ad hoc procedures to cope with limited water supply in the dry season. Crop diversification efforts further suffered from the oversupply of irrigation (more than 1.2 liters/second per hectare), field structures that were inappropriate or inadequate in number to effectively manage water for non-rice crops, and unstable prices and high input costs. Researchers also found that seepage water from rice paddies could be effectively used to irrigate adjacent non-rice crops, and that there was potential for increasing efficiency and effectiveness of water use through greater crop diversification. These results were fully documented in a final report to the Government of the Philippines and the ADB in December 1986.

In **Indonesia**, research in selected irrigation systems of East, West, and Central Java found constraints different but related to those found in the Philippines and Sri Lanka. Indonesia's irrigation infrastructure and its underlying principles of irrigation water management are among the most sophisticated in Asia. The systems' infrastructure and the associated management practices were refined by the Dutch during the last century. Following a period of deterioration during World War II and before independence, the systems were rehabilitated and upgraded by the Government with financing from international lenders. Constraints found in the present systems stem from the complexity of system management practices.

The abundance of information necessary to apply existing management tools to the problems of water distribution places unrealistic demands on agency staff and facilities in Indonesia. Specifically, the present management system requires more accurate water measurement at many



IIMI's Resident Scientist in the Philippines inspects a field channel with officials from the National Irrigation Administration, IIMI's partner agency in the Philippines.



The lack of adequate irrigation measuring devices at different points in the system is an important constraint to irrigation management for non-rice crops in Indonesia.

additional points in the system, construction of appropriate field structures, and a timely supply of information about water supply and cropping patterns. However, due to budgetary limitations, Indonesia's irrigation agencies face significant difficulty in alleviating these constraints. A full report on IIMI's research and a set of recommendations to improve irrigation management were submitted to the Government of Indonesia and included in an Interim Report to the ADB at the end of 1986.

In November 1986, IIMI researchers from all three countries joined 25 other participants from developing countries at the IIMI-hosted international conference on "Irrigation Management for Diversified Cropping." The purpose of the conference was to review current research findings from IIMI and others, to compare differences in irrigation system management, and to develop future research activities that would lead to improved methodologies. Participants identified numerous farmer-, agency-, and system-level constraints to irrigation for diversified cropping and the changes needed to alleviate each constraint.

Resource Mobilization

Irrigation systems need resources to remain viable and effective. Resources are of two kinds: maintenance labor from farmers, and financial support from farmers and agencies. The short life spans of many systems result from inadequate financial support. The benefits of rehabilitating a system are frequently lost, partly because the resources to sustain the high performance levels are not made available once rehabilitation is complete, and more often than not, the system is reduced to the previous operating levels within five to ten years. IIMI researchers made important progress during 1986 in identifying where resources should be applied in order to sustain operations and maintenance (O&M). They also explored a number of options open to countries for generating and mobilizing resources. They explored various means of generating resources which are feasible, cost effective, equitable, and which reinforce -- rather than oppose -- efficient irrigation practices.

IIMI made a major contribution to research in this area in early 1986 when it completed an ADB-financed five-country study of the way in which financial and human labor resources are mobilized to support the costs of O&M. The five

countries chosen -- Indonesia, Korea, Nepal, Philippines, and Thailand -- typified a range of financing and cost recovery mechanisms, including land taxes, irrigation service fees, and indirect taxes such as rice export levies. IIMI prepared five country reports for ADB, each with a series of recommendations.

Researchers learned that countries which finance O&M activities through irrigation service fees have greater success with financially autonomous irrigation agencies than with government line agencies that are dependent on budgetary allocations from the treasury. They also concluded that it was probably not feasible to collect irrigation service fees based on the volume of water used because of the inability of most agencies to accurately measure water consumption at the turnout and because of the administrative costs of collecting fees from the large numbers of individual farmers usually found in the irrigation systems of developing countries. There does, however, appear to be scope for charging organized groups of farmers served from a common canal. The feasibility and benefits of bulk wholesaling of water to user groups at the secondary level will be studied further.

In July 1986, IIMI organized and presented the results of these studies to senior irrigation officials from 13 Asian countries in a seminar held at ADB's Headquarters in Manila. IIMI and ADB jointly published the seminar proceedings, entitled "Irrigation Service Fees," in late 1986.

During the remainder of 1986, research continued on resource mobilization in Sri Lanka, and in the states of Bihar and Haryana in India. Detailed studies at the irrigation system level were also commissioned in Korea.

Irrigation Institutions

With its emphasis on management, IIMI has placed a high priority on research into organizational issues affecting the performance, equity, and sustainability of irrigation systems. During 1986, the Institute carried out research on irrigation institutions as an integral component of its interdisciplinary studies on improved management for crop diversification in both Sri Lanka and Indonesia.

At the two Sri Lankan field sites, researchers documented farmers' irrigation behavior during the critical demand phase

"Researchers learned that countries which finance O&M activities through irrigation service fees have greater success with financially autonomous irrigation agencies than with government line agencies..."



The cost of O&M activities becomes relatively more expensive as systems grow older.

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“An important part of IIMI’s 1986 research in Indonesia was to find out how institutional factors influence the way systems are managed.”

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of the dry season, when non-paddy crops predominate. Attention focussed on what farmers know about the water distribution practices of other farmers, and on the amount and kind of communication between farmers and agency managers. The findings revealed ad hoc arrangements among farmers below the turnout. In small turnouts this approach proved adequate, but in larger turnouts the lack of organization resulted in a reliance by tail end farmers on night irrigation. The lack of organization among turnout groups sharing a common distributary was at least as critical as the lack of organization within turnouts.

The inability of agency officials to accurately predict water demand along a distributary, and the inefficiency of water allocations among turn-outs, is linked to organizational inability to effectively communicate information up and down the system, particularly toward the beginning of the season. During the growing season, however, when water demand is relatively consistent and predictable, water distribution at all levels improved.

In September 1986, IIMI began agency-level research at the same two Sri Lanka field sites. IIMI will thus add to the knowledge and understanding of the managing agencies themselves, analyzing their structure, behavior, and constraints. IIMI is testing hypotheses regarding the linkages between water management as a dependent variable and the agency management structure as the independent variable. By the end of 1986, data had been collected through participant observations of various types of meetings, formal and informal interviews with officials and farmers, and analysis of written material from files.

In October, IIMI initiated research at a new site in southern Sri Lanka, the Kirindi Oya Project. This settlement and irrigation scheme was inaugurated in early 1986. There was extensive interaction with Irrigation Department officials regarding the problems to be addressed, the location of the sample area, and the details of collaboration between IIMI and the agency. IIMI then began field work on a large distributary canal, focussed on the interaction between farmers’ irrigation behavior and that of the agency, and on water delivery performance. IIMI documented a range of problems regarding water delivery, farmer cooperation, and farmer-agency communication in this new system. By the end of the year, it appeared that the crop season would fail due to lack of rain to fill the reservoir.

An important part of IIMI's 1986 research in Indonesia was to find out how institutional factors influence the way systems are managed. IIMI has done this in four ways. First, it has developed decision models which reflect the considerations made by farmers in deciding whether or not to plant a non-rice crop. This approach has shown that irrigation and drainability are very important factors in farmers' inclinations to diversify their cropping or not. Second, IIMI has monitored the time use of a small sample of irrigation field staff in an attempt to understand management activities and how they effect irrigation performance. Third, IIMI has directly observed how irrigation agency field staff adjust gates and record discharges, and has recorded the difference between actual practice and when prescribed procedures are followed. Last, IIMI has mapped the nature of management information flows in order to identify the location of weaknesses, and the type of information used for making management decisions.

Performance Monitoring and Evaluation (M&E)

The capacity to improve management and performance of irrigation projects presumes the ability to identify and evaluate gaps in performance. The need for improvement must first be demonstrated; whether or not a change in either infrastructure or associated management practices is appropriate must also be evaluated in terms of their effects on the performance of the overall irrigation system.

In response, IIMI is developing appropriate methods and criteria to measure performance of irrigation systems (and irrigated agriculture), and to identify and measure the potential for improved system performance. During 1986, work moved ahead rapidly to develop a framework for performance monitoring and refine performance measures that would predict yield loss due to water shortage.

In September, researchers from IIMI Headquarters and IIMI's cooperating units held a workshop in Sri Lanka to determine an appropriate definition of irrigation M&E. A second purpose was to develop a uniform set of performance measures and measurement procedures which IIMI could employ at all its field sites, and which, after testing, could then be incorporated into guidelines for general use.

The discussions reflected the wide divergence of opinion held by professionals in the irrigation community. Although

participants agreed that water flow and water adequacy data are needed for all field level research, many felt that it was not necessary or desirable to establish a minimum data set that should always be collected. To be meaningful, the minimum set would vary or expand depending on the specific research and location. According to participants, in order to collect the maximum amount of data, irrigation performance should be evaluated from several perspectives that reflect farmer, agency, or national objectives, even though these objectives could be, and often are, contradictory.

Staff began testing a field-level methodology for measuring the adequacy and equity of water distribution in lowland rice irrigation systems. Indices were developed for measuring the frequency, duration, and intensity of water stress. Those indices were correlated with yield data from Indonesia and the Philippines. In 1987, IIMI will apply this methodology to the analysis of data collected at its Sri Lankan field sites.

System Management in Pakistan

IIMI began its program in Pakistan by studying two distributary canals, the lower thirds of which were lined with mortar and concrete in early 1985. In response to a request from the Punjab Irrigation Department, the Institute evaluated the impact of the lining on water supply and delivery. Results presented in a report to the Department indicated that water conditions had improved considerably at the tail end of both channels, with increased discharge and less variability in daily supply. But other changes in the irrigation system, particularly a substantial increase in inflows into the distributaries, made it difficult to attribute the improved conditions to any single improvement.

Following these studies, staff began preliminary investigations of the variability in discharge of the two distributaries and their upper branch canals. Analysis of two years of data has not confirmed the usual assumption that water deliveries into distributaries and watercourses are constant throughout the year. IIMI hypothesizes that variable discharge at those points affected the way farmers cope with their irrigation supplies.

Workshops

In May, IIMI and Sri Lanka's Irrigation Management Division of the Ministry of Lands and Land Development

"The capacity to improve management and performance of irrigation projects presumes the ability to identify and evaluate gaps in performance."

jointly sponsored the "Workshop on Participatory Management in Sri Lanka's Irrigation Schemes." The workshop brought together irrigation managers, policy makers, and researchers to discuss the various approaches to participatory management which have been attempted in Sri Lanka. The three days of sessions underscored the rich variety of conditions and range of organizational structures in Sri Lankan irrigation and afforded an opportunity to share experiences across agency lines. The participants strongly recommended continued support for testing methods to enhance participatory management, and to provide the policy and legal basis for its expansion. IIMI published the proceedings in late 1986.

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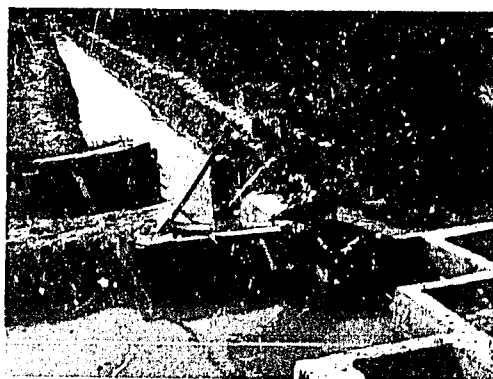
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Research Program: System Rehabilitation and Improvement

Due to the rapid pace of irrigation development in the past 40 years, many countries now have relatively few sources of water left for new irrigation systems. In order to satisfy the need for additional irrigation potential, attention is turning to the rehabilitation and modernization of existing systems. However, many rehabilitation projects do not adequately take into account changes in cropping patterns, agricultural practices, and area irrigated. Design criteria are often based on narrow engineering objectives, rather than on the needs of water users. Although systems often deteriorate prematurely because of operations and maintenance (O&M) weaknesses, rehabilitation projects rarely attempt to strengthen the management system at both farmer and agency levels. In such cases, the "improved" system may be difficult to manage, and an unmanageable system is one whose benefits will not be sustained.

IIMI addresses these problems through two research activities: rehabilitation processes and design and management interactions. The first comprises research on the rehabilitation strategies and decision making processes in use among funding agencies, consultants, irrigation agencies, contractors, and farmers. Three concepts guide this work: improving performance, manageability, and sustainability. One or more of these is usually a stated objective of rehabilitation projects. All of them are interrelated, and all have both social and technical dimensions.

Second, IIMI researchers try to identify the design improvements that would enhance the performance and manageability of systems. In many older systems, the physical design places severe limitations on the potential performance of the system. IIMI examines the options in terms of design and technology for conveyance, control and regulation, and the interactions of the design, management processes, and the environment as they affect performance and manageability.

This program is off to a good start. By the end of the year, staff had defined the objectives and strategy, explored and identified a number of potential research sites, initiated documentary and field research, and identified funding for projects that will begin in 1987. Although much of the early work has and will take place in Sri Lanka, IIMI anticipates shifting to cross-national comparisons sometime in 1988-89.



IIMI plans to begin cross-country comparisons of design management data collected in Sri Lanka with available data in Morocco.

“Due to the rapid pace of irrigation development in the past 40 years, many countries have relatively few sources of water for new irrigation development.”

Rehabilitation Processes

"IIMI is well placed to observe the rehabilitation planning and implementation process from the perspectives of farmers, agencies, and consultants."

In the first months of 1986, IIMI carried out reconnaissance of potential research sites in Sri Lanka. During the balance of the year, researchers worked in two areas. In southern Sri Lanka, the right bank of the Uda Walawe system is being rehabilitated with funding from the ADB. After intensive collaboration between IIMI and agency staff on the objectives and sites for research, field work began in October. IIMI's research focused on farmers' practices and irrigation problems on an unimproved distributary canal, and their level of cooperation with the agency involved. The major purpose is to establish a baseline for evaluating the reconstruction process when it begins, and the impact of rehabilitation. By the end of the year, the research focus had expanded to include the process of system management by the agency, and the communication between design engineers and farmers. Researchers also participated in the monthly progress meetings of the rehabilitation project staff. Thus, IIMI is well-placed to observe the rehabilitation planning and implementation process from the perspectives of farmers, agencies, and consultants.

In September, staff completed a case study of north central Sri Lanka's World Bank-supported Tank Irrigation Modernization Project, which was completed in 1984. Based on document analysis and interviews with relevant agency personnel, IIMI researchers examined changes in the initial plans which were made during project implementation, with particular emphasis on changes in physical reconstruction. They also assessed the degree to which lessons learned were incorporated into a follow-up project, which began in 1985. This work was presented at the "International Conference on Irrigation System Rehabilitation and Betterment" held in October 1986 in Washington DC.

Also in October 1986, IIMI, the Government of Sri Lanka, and ADB signed a Memorandum of Understanding for a Technical Assistance Grant. This grant will support the expansion of IIMI's research, expected to begin in 1987, at both Uda Walawe and Kirindi Oya.

Design and Management Interactions

The design characteristics of an irrigation system form one set of parameters. System management can be defined by

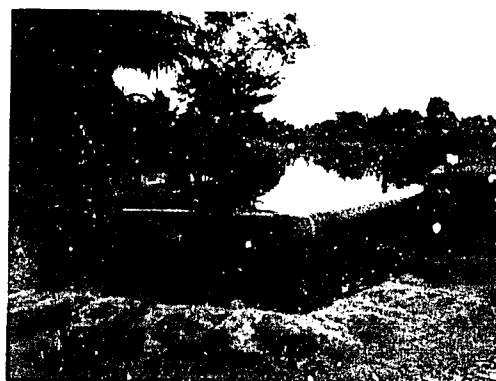
another set. It is the interaction between the design parameters and the management parameters in a given environment that determines system performance; the efficiency of the system can be identified when actual performance is evaluated against the system's objectives and target performance.

During 1986, IIMI developed a framework for use in analyzing selected aspects of design/management interaction across a range of irrigation projects. Next, research staff identified opportunities in Sri Lanka to use this framework to study infrastructural and management innovations intended to improve canal manageability and performance. In 1987, the application of this framework will be extended to other countries, where completely different irrigation planning and design concepts have been applied.

A practical framework that relates the main functions of an irrigation system to the planning and design process is long overdue. As a step in this direction, the framework developed by IIMI defines the "universal" functions that the design of any irrigation system must take into account, namely, mobilizing water and mobilizing land. The first comprises four sub-functions: conservation, conveyance, distribution, and drainage. The second comprises the allocation of land and water rights, and the creation of investment opportunities for production by consolidating, levelling, and draining agricultural land.

In Sri Lanka, IIMI's research focuses on how the design and management processes influence the conveyancing and distribution functions. This focus is particularly important for the large systems and complex canal networks found in Asia, and is based on three assumptions: 1) that as yet untapped potential exists for improving main system performance, 2) that alternative designs associated with management innovations have potential for improving the performance of main canals, and 3) that such improvements can help sustain the work of irrigation agencies to provide more equitable, reliable, and efficient supplies of water to farmers.

A high level of control of water levels and flows along main canal reaches is a precondition that is necessary before sustained improvements in distribution from the main canals can be achieved. In Sri Lanka, the variety of designs in place offer opportunities for comparative study of the impact main canal designs have on irrigation management and performance. IIMI has identified four such systems. These sites



The variety of main canal designs in place in Sri Lanka, such as this duck bill weir, offer staff an excellent opportunity for cross-system comparisons.

exhibited different design concepts for water level control in their main canals -- duck-bill weirs, manually-operated cross regulators, and hydro-mechanical gates for water level/discharge control, which are being pilot-tested in two of the systems. The output will be a report evaluating and comparing the actual performance achieved during primary distribution from main canals, the intensity of management required, and the level of manageability obtained.

Although widely used in the United States and Europe, mathematical simulation models representing the hydraulic behavior of main canals have found limited application in Asia. IIMI believes such models have potential for improving performance in Asian irrigation systems. In 1986, IIMI researchers and an international consultant visited four Sri Lankan systems and chose two as appropriate for initiating such application. In 1987, IIMI hopes to collaborate with the Irrigation Department and the consultant to establish a simulation model on one of the systems where managing 14 gated cross regulators and 35 offtakes along 30 kilometers of main canal is critical for improving system performance. The output, expected sometime in 1988, will be a research and management tool to test a variety of main system designs and management scenarios. It will also provide a valuable training tool to familiarize system managers with modern techniques of canal regulation.

A principal research activity underway in 1986 outside Sri Lanka was the study of rehabilitation and water management in four Philippine irrigation systems. This work explored the relationships between water control, management, structural facilities, and design choices on previously rehabilitated systems. IIMI researchers monitored water management activities in order to compare actual flows in canals, water deliveries, and water management strategies with anticipated performance at the time of rehabilitation.

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Research Program: Farmer-Managed Irrigation Systems

Farmer-Managed Irrigation Systems (FMIS) contribute substantially to the national economy of many countries in the developing world. In hilly areas such systems tend to be small due to topographical constraints but in lowland areas some of the systems extend over 5,000 hectares. Due to the large number of farmer-managed systems, the total land area involved and the farm families they support exceed those of agency-managed systems in some countries. In Nepal, for example, it is estimated that over 80 percent of the total irrigated area falls under the command of farmer-managed systems; in the Philippines, it is nearly 50 percent.

Engineers and government agencies have in the past dismissed as inefficient and insignificant the contribution of farmer-managed irrigation to irrigated agriculture. However, more and more studies of these systems have shown their viability and value. As a result, government attention is turning toward enhancing their capacity rather than replacing them with new systems which often disrupt the existing farming practices.

IIMI initiated FMIS research to evaluate the institutional, social, and technical dynamics of these systems; to identify areas for potential management improvements; and to develop workable strategies for assistance that lead to more sustainable and productive system performance. IIMI's focus reflects two government trends: 1) increasing involvement in the rehabilitation and O&M of the systems, eventually bringing a portion of the system (usually the headworks) under agency supervision, and 2) decreasing involvement in system management by turning over to farmers the day-to-day management activities of public-managed systems. The appropriateness of these depends on the socio-economic environment in which interventions take place. Much of IIMI's 1986 research sought to evaluate when and how interventions could be successful, and to develop appraisal techniques to enable managers and planners to reach informed conclusions about intervention options.

Farmer-Managed Irrigation Systems in Sri Lanka

During 1986, IIMI produced preliminary results of research on a cluster of small rainfed earthen-bund reservoirs



Much of IIMI's 1986 research in the farmer-managed irrigation sector was carried out in Nepal

"In Nepal, for example, it is estimated that over 80% of the total irrigated area falls under the command of farmer-managed systems"

(tanks) at IIMI's field site in the North Central Province (NCP), and on two small diversion systems in the Southern Province.

In the NCP study, a household census was conducted in villages near the tanks and a sample of farmers was interviewed through a structured questionnaire. Preliminary results suggested that widely variable dates of rice planting in the wet season have been an important constraint to efficient irrigation management at the end of the season and during the succeeding dry season. A case study is expected in 1987.

Preliminary results from the second study revealed complex rules of water allocation, involving rotations of different parts of the command area which receive water in successive seasons. Government sponsored improvements to one system have altered the effective water rights of farmers in various sections of the command area at the expense of recently settled farmers in the tail end portions. A second case study, examining the relationship between management interventions and property rights, is expected during 1987.

Farmer-Managed Irrigation Systems in Nepal

Most of IIMI's FMIS research to date has taken place in Nepal. The two Resident Scientists posted in Nepal have a dual role: to carry out direct research there, and to promote FMIS research in India, Pakistan, northern Thailand, and Bhutan.

Since 1985 the Nepal team has collaborated with the Water and Energy Commission Secretariat (WECS) to strengthen that organization's capacity to manage irrigation-related research. During 1986, IIMI assisted WECS in developing methods to identify and solve irrigation management problems by tapping farmer experience through farmer-to-farmer consulting. Farmers who had found solutions to problems in their systems were organized to visit and exchange information with farmers from systems that still had the problem.

Another activity with WECS, an inventory of irrigation systems in the Indrawati River basin, was completed in 1986. This inventory supported an assessment of land and water utilization to identify the potential for expanding and intensifying irrigation. Of the 152 systems found in the 200



The development of irrigation tanks (reservoirs) dates back to 505 BC in Sri Lanka.



IIMI's Resident Scientists in Nepal work closely with staff of WECS in designing a government assistance program in the Indrawati River Basin.

square kilometer area, 119 had canals longer than 0.5 kilometers, and 21 had potential for expansion. The assessment also revealed the need to organize users for O&M, develop rules and sanctions for water distribution, and improve certain structures.

Among the largest FMIS reported anywhere are those found in Nepal's Western Tarai (plains), which were visited by IIMI staff on two reconnaissance trips in 1986. In one of these systems, farmers had built three major diversions from the western branch of the Karnali River, creating a command of about 15,000 hectares. The annual mobilization of labor for desilting and diverting water into the channel where the canal intakes are located was estimated at approximately 100,000 person days. Nepali research fellows from the Asian Institute of Technology (AIT) in Bangkok, Thailand, and from the Tribhuvan University and Kathmandu's Institute of Agriculture and Animal Science will continue to study the management of these systems in more detail under supervision of the IIMI Resident Scientists.

The Nepal Conference. In August, IIMI hosted the international conference on "Public Intervention in Farmer-Managed Irrigation Systems" in collaboration with WECS. Sixty conference participants met to discuss recent and ongoing FMIS research, as well as agencies' experiences in assisting these systems. Participants included researchers and officials from irrigation agencies in Bangladesh, India, Indonesia, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, Morocco, Niger, and Senegal. Following the conference, IIMI organized a two-day field trip to several FMIS in the Chitawan Valley of the South Central Tarai, near Kathmandu.

Farmer-Managed Irrigation Systems Research Network

The FMIS Research Network was a principal outcome of the conference on "Public Intervention in Farmer-Managed Irrigation Systems." IIMI was asked by the participants to facilitate and coordinate the Network. During 1986, FMIS program staff identified nearly 100 members in more than 20 countries; made plans for 1987, including plans for study tours, workshops, two-way consulting opportunities, and the provision of common methodologies for undertaking activities by agencies represented in the Network; and set up a quarterly newsletter to encourage information exchange and publication of research results.

"Among the largest farmer-managed irrigation systems reported anywhere are those found in Nepal's Western Tarai... ."



The Farmer-Managed Irrigation Systems Network includes study tours and two-way consulting activities.

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Farmers manage 80 percent of the irrigated area in Nepal

Professional Development Program

Irrigation agencies are now acutely aware that the typical irrigation manager, highly technical and engineering oriented, is not prepared for the myriad socio-economic issues faced in the field. At the same time, engineering skills cannot be overlooked and should not be deemphasized.

IIMI's Professional Development Program responds to this need in two ways: by preparing irrigation practitioners from developing countries for leadership roles in strengthening irrigation performance through better management, and by training researchers for multidisciplinary and collaborative field research. The Program has five complementary activities: workshops and conferences, training courses, individual training, on-the-job training, and special awards. IIMI has made significant progress in each of these areas.

"... the typical irrigation manager, highly technical and engineering oriented, is not prepared for the myriad socio-economic issues faced in the field."

Workshops and Conferences

Conducted by IIMI and its partner institutions, workshops and conferences provide opportunities to share information on particular irrigation management topics, put irrigation management professionals in contact with one another, and allow IIMI to review and disseminate its own research findings. Generally the topics covered reflect those of IIMI's three research program areas. In 1986 IIMI co-sponsored and hosted five such workshops and conferences.

List and Schedule of Workshops and Conferences 1986.

"Participatory Management in Sri Lanka's Irrigation Schemes," held at IIMI Headquarters, Digana Village, Sri Lanka, 15-17 May.

Regional seminar on "Irrigation Service Fees" (with the ADB), held in Manila, Philippines, 21-25 July.

"Public Intervention in Farmer-Managed Systems," held in Kathmandu, Nepal, 4-7 August.

"Social Science Perspectives in Managing Agricultural Technology" (with Rockefeller Foundation) held in Lahore, Pakistan, 24-27 September.

"Irrigation Management for Crop Diversification," held at IIMI Headquarters, Digana Village, Sri Lanka, 24-27 November.



Senior level irrigation officials from Asia and Africa participate in the annual training course on "Planning and Management in Irrigation Schemes in Asia and Africa," which IIMI co sponsors with the World Bank's Economic Development Institute.

"In Nepal, a PhD Fellow in rural sociology carried out research on the relationship between resource mobilization for irrigation activities and property rights."

Training Courses

Training courses at IIMI improve the knowledge and skills of senior and mid-level officials in planning, evaluating, and managing irrigation systems. From 9 June to 18 July, IIMI held the course on "Planning and Management of Irrigation Schemes in Asia and Africa" in cooperation with the World Bank's Economic Development Institute (EDI). Twenty-three participants from 11 Asian and African countries attended (see Box 1). Coursework was intended to enhance the participants' understanding of sound policies for supplying, using, and disposing of water as a major input to agricultural production; irrigation technologies; and the institutional frameworks in which irrigation schemes can successfully improve and sustain agricultural production.

Individual Training

IIMI's individual training programs encourage research on specialized aspects of irrigation management at a high academic level. Post-doctoral Fellowships, Research Fellowships and Scholarships, and Special Awards offer opportunities for mutual benefit through research on aspects of irrigation management closely allied to IIMI's own activities.

Post-doctoral Fellowships are offered to individuals who complete commendable doctoral research on irrigation management issues; at IIMI, they conduct specialized research on IIMI projects. Research Fellowships (pre-doctoral) and Research Scholarships (Masters level) are awarded to graduate students to conduct thesis research on IIMI projects in collaboration with research staff. Special Awards are given to irrigation professionals to document their field experience with innovative approaches that improve the performance of irrigation systems (See Box 2).

In Sri Lanka, for example, one Post-doctoral Fellow developed a field-level methodology for measuring water adequacy and equity of distribution for lowland rice irrigation systems. IIMI staff expect to begin applying this methodology to the analysis of data collected at its Sri Lanka field sites in 1987. In Nepal, a PhD student in rural sociology carried out research on the relationship between resource mobilization for irrigation activities and property rights. During 1986, he observed and documented irrigation and agricultural practices in the field, after having completed archival

research in London and New Delhi to trace the evolution of irrigation policy in Nepal over the last century.

Special Awards evolved as an innovative two-way communication channel between IIMI researchers and the irrigation functionary in the field. Its potential was realized with IIMI's first Special Award recipient, Mr. Honorio Bautista, Manager of the Agricultural Development Division of the Magat River Irrigation Project in the Philippines. His case study, published in late 1986, documents his experiences with organizing farmer irrigation organizations on nearly half the 100,000 hectare project.

Box 1. List of 1986 IIMI-EDI participants in the "Planning and Management of Irrigation Schemes in Asia and Africa" Course

Zhu Ping, D/Division Chief (Govt. Official) World Bank Division 2 Ministry of Finance	China	K. Pathmasiri Perera, Irrigation Engineer Hydraulic Research Laboratory Irrigation Department	Sri Lanka
Fritz Hutasoit, Chief of Section 1 Planning & Design, Dept. of Public Works Directorate General of Water Resources Directorate I, Subdit Planning & Design	Indonesia	D. A. Handapangodage, D/Resident Project Manager (W.M.) System C, Mahaweli Economic Agency	Sri Lanka
Kusnadi Bachrudin, Chief of Staff Madiun Irrigation Project	Indonesia	K.G.K. Wickremasinghe, D/Resident Project Manager (W.M.) System H, Mahaweli Economic Agency	Sri Lanka
Daud Berahmana Water User Development Section Staff Directorate of Agriculture Area Development Department of Agriculture	Indonesia	Ranjinee Lanka Haturusinha, Deputy Director Systems C & H Mahaweli Engineering Construction Agency	Sri Lanka
Byong-Ho Lim, Chief Development Division, Overseas Department Agricultural Development Corporation	Korea	K.N. Wickramaratne, Chief Design Engineer System B Mahaweli Engineering & Construction Agency	Sri Lanka
R. B.Hj. Mohd. Sharif Senior Drainage & Irrigation Engineer Kuala Lumpur Flood Mitigation Project Drainage & Irrigation Department	Malaysia	Rasih Arumainayagam, Project Manager M.I.K. Scheme	Sri Lanka
Teh Siew Keat, Senior Engineer Drainage & Irrigation Department	Malaysia	A. A. G. El Maghoul, Deputy Director Projects Directorate, Ministry of Irrigation	Sudan
Kabi Raj Khanal, Section Officer Water Resources Division National Planning Commission Secretariat	Nepal	Mohamed A. Abdulla, Resident Engineer Khashm El Girba Dam Division Ministry of Irrigation	Sudan
A.Y. Ranjha, Principal Scientific Officer Land & Water Resources National Agricultural Research Centre	Pakistan	Teerapan Panumong, Project Planning Engineer Engineering Section, Regional Office No. 1 Royal Irrigation Department	Thailand
Graciano N. Labayog, Project Manager Construction Management Department National Irrigation Administration	Philippines	Boonyong Piyasiriroon, Chief Program & Technical Support Section, O & M Division Royal Irrigation Department	Thailand
Jose M. Alcantara, Principal Engineer D Communal Irrigation Development Project National Irrigation Administration	Philippines	B. Wacharanapapan, Policy & Plan Analyst Economic Project Division National Economic & Social Development Board	Thailand
		J.M. Makadho, Chief Irrigation Specialist Agritex - Irrigation Division	Zimbabwe



Collaborative research offers significant opportunities for on-the-job training.

On-the-Job Training

Staff of collaborating agencies and research organizations receive on-the-job training in their association with IIMI research staff. Such collaboration provides opportunities for participating agency staff to learn new research methodologies, acquire and test irrigation management tools, and discuss new ways to promote the effective use of irrigation water. IIMI's Indonesian activities in 1986, for example, were conducted with the assistance of 16 engineers seconded by Indonesia's Directorate-General of Water Resources Development, and under the guidance of high level officials in that agency.

Research on Irrigation Management Training

Research comparing irrigation training programs to country needs became part of IIMI's Professional Development Program in 1986. At the request of the Sri Lanka-IIMI Consultative Committee, IIMI undertook the first in-depth study of training needs in Sri Lanka. The work was financed by the Government through a World Bank credit. The final report will be published in 1987, and will recommend to the Committee that a small inter-agency Professional Development Team be organized to address questions of expanding irrigation training and improving communication among agencies.

Papers Prepared, Presented, or Published.

Bautista, Honorio B. 1986. *Experience with organizing irrigators associations: A case study of the Magat River Irrigation Project in the Philippines*. Case Study No. 1. Digana Village, Sri Lanka: International Irrigation Management Institute.

Box 2. Fellowships and Special Awards.

Postdoctoral Fellowships

Participant/ IMI Adviser	Dates	Research Topic
Poh-Kok Ng/ Leslie Small	1985 1987	Development of indices of irrigation performance
Hilmy Sally/ Daniel Berthey	1985 1987	Canal regulation/flow simulation and design management interaction in rehabilitation of irrigation systems
Douglas Vermillion/ Sam Johnson	1986 1987	Institutional component of irrigation management in Indonesia
Namika Raby/ Douglas Merrey	1986 1988	Irrigation agency processes
M. Akhtar Bhatti/ James Wolf	1987 1988	Irrigation water management at farm level in Pakistan

PhD Research Fellowships

Participant/ IMI Adviser	Dates	Research Topic
Russell Cramer/ David Groenfeldt	1985 1987	Farmers' management decisions in small tank irrigation systems of Sri Lanka
Rolando Hechanova/ Alfredo Valera	1985 1986	Simulation of soil water and root distribution of corn (Philippines)
Christopher Wensley/ Senen Miranda	1986 1987	The sustainability of rehabilitation in rice-based Philippine irrigation systems
Ujjwal Pradhan/ Edward Martin and Robert Yoder	1986 1987	Property structure and resource mobilization in hill systems in Nepal
Wimson Purba/ Sam Johnson	1986 1987	Irrigation water management for the small basin (sorjan) system (Indonesia)
Shyamala Abeyratne/ Edward Martin	1986 1987	Farmer-managed anicut schemes with focus on government intervention (Sri Lanka)

Box 2. Fellowships and Special Awards. (Continued.)

MS Scholarships

Participant/ IIMI Adviser	Dates	Research Topic
M. Elkaduwa / Senen Miranda	1985 1987	Field studies on irrigation management practices in System C of the Mahaweli Development Scheme
M. Reyes/ Alfredo Valera	1985 1986	The consumptive use of whitebean and its tolerance to drought and flooded conditions
Wily Dumayas/ Alfredo Valera w/advice from Douglas Merrey	1986 1987	The effects of farmers' parti- cipation in the management and operation of the "Banga River Irrigation System" (Philippines)

Special Awards

Participant/ IIMI Adviser	Dates	Research Topic
Honorio Bautista/ Douglas Merrey	1986	Experiences with organizing irrigation associations: case study from the Magat River Irrigation Project in the Philippines

Information Program

Across the developing world, many irrigation managers and researchers work in relative isolation due to geographical distances, weak communication linkages, and poor access to research results. IIMI staff often report cases, for example, where an irrigation manager in the Senegal River Valley is confronted with a problem that was solved years before in Indonesia. At IIMI, the Information Program staff work with research staff to bridge these gaps by developing networks to exchange information, publishing the results of conferences and collaborative research, and using communication research to improve both.

But setting up a program to carry out these functions is a difficult task. Staff must be hired and trained, equipment must be matched to purpose, then purchased, tested and maintained; reliable suppliers must be identified; and procedures established. In that light, the Information Program's progress in 1986 has been substantial.

Information Exchange and Networking

In 1986, a bibliographic database was created which, when fully operational, will serve the Irrigation Management Information Network (IMIN), a group of irrigation researchers and professionals, mostly in developing countries. IIMI's documentalists were hired in January and, with guidance from a consultant, prepared and tested database file formats. A keyword thesaurus was written and revised in collaboration with IIMI's research staff, and a database operations manual was prepared, both for publication in 1987. By year's end, nearly 2,000 citations had been added and the database was available for search and retrieval by researchers and visitors to Headquarters. A Bibliography of documents cited in the database will be published in 1987.

IIMI also embarked on an innovative approach to decentralize its bibliographic database using powerful yet inexpensive micro-computers. The intention is to network these computers among IIMI's overseas offices thus giving researchers immediate access to the database, and to eventually expand the network to include other organizations that are active in irrigation management. In order to test this approach, a prototype information network was set up in 1986 between IIMI Headquarters, the library at the Overseas Development Institute (ODI) in London, and the IIMI Office in Jakarta, Indonesia. In July, bibliographic data entered in compatible

formats at these three sites were successfully integrated into the core database at IIMI Headquarters in Sri Lanka, screened, and redistributed to the two collaborators on floppy disks.

In 1986 IIMI's Library Services also saw rapid development. The greatest part of the year was spent setting up the library; establishing procedures for ordering, processing, and circulating acquisitions; preparing an initial "core" order of books and periodicals; and cataloguing existing materials. A classification system was devised in collaboration with IIMI's program staff. An agreement made late in 1985 with Wye College enabled the photocopying of unpublished documents from ODI and from private libraries in the United Kingdom. The first shipment arrived in 1986 and these materials were among the first to be processed. The citations for all materials in IIMI's Library are stored by computer in the IMIN database.

In 1986 Memoranda of Understanding were signed with ODI for exchanging library materials, and with the International Commission on Irrigation and Drainage (ICID) in New Delhi, India, for inter-library loans, publication exchange, and collaboration in database and documentation activities. An informal information exchange agreement with the International Irrigation Information Center (IIC) assured IIMI access to this important source of information. In Sri Lanka, document exchange agreements were signed with the United Nations Development Programme (UNDP), Maïa Institute, the Agrarian Research and Training Institute (AR&TI), and the Peoples' Bank. The IIMI Library became a member of SLSTNET, a mechanism through which IIMI has inter-library loan privileges with any member library in Sri Lanka, and AGRINET, which provides a documentation service through which materials requested by IIMI staff can be obtained.

Publishing

At the end of 1986, the IIMI publications unit was fully equipped and staffed to edit, typeset, and print in-house publications. In May, the binding equipment (collator, stitcher, folder, and puncher), digital phototypesetter, and computer equipment arrived. The offset duplicator, camera/electrostatic platemaker, paper cutter, and paper/film processor came in late August. Technical staff hired in 1986 included an

Editor/Writer, Printer, Typesetter, Artist, and Publications Assistant. However, due to limited opportunity to train staff and equipment installation problems, the majority of publications were printed by commercial printers.

By December, 15 titles had been published or were in the final stages of production. These included two management briefs, three research monographs, two Director General's newsletters, two proceedings, one brochure, one miscellaneous publication, the 1987 program and budget document and the 1984-1985 Annual Report. Five more publications were in the early stages of editing and production. To help insure high quality and relevance to IIMI's mandate, a Publication Review Committee was set up to review submitted manuscripts.

Through an agreement with the Centre de Formation Internationale a la Gestion des Ressources en Eau (CEFIGRE) in France, the IIMI Brochure and Research Paper No. 1 were translated into French, published, and distributed to addresses in Francophone Africa. At the end of 1986, IIMI was taking steps to hire a full-time translator, and to expand its bilingual capacity to accommodate its planned research program in Francophone Africa.

As part of the Agreement with ODI, IIMI agreed to collaboratively produce the ODI-IIMI Irrigation Management Network Newsletter for two-three years. During 1986, three issues were published in and distributed to the 900 network members. Steps were taken to increase distribution to 2,000, and to translate and print a French version of the newsletter and selected papers for distribution to Francophone Africa by the end of 1987.

To facilitate dissemination, IIMI computerized its mailing list of 2,023 addresses in 114 countries. Mailing list return cards arrived at the rate of 4-6 per day. To these addresses, 15,000 publications were distributed through the mails.

Communication Research

In 1986, communication research in the Information Program was limited to monitoring publication use and impact. Both IIMI Research Papers published during the year contained a brief survey form requesting comments from readers. Questions asked readers where they obtained the report, to

what extent they read it, what they did with it after reading, and in what condition it arrived. Although response was light (3 percent of those mailed), indications were that most respondents got their copy directly from IIMI, while about 40 percent were given the report by a colleague. The reports were usually read cover-to-cover, and then passed on to others or sent to a library. It is intended that such monitoring will be expanded and become an on-going part of the Information Program.

Papers Prepared, Presented, or Published

Cowell, Robert. 1986. *International Irrigation Management Institute: Program concepts*. ODI/IIMI Irrigation Management Network Newsletter 86/1b (April).

Financial Statement

Ernst & Whinney

Chartered Accountants

OFFICES 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, 1986 exhibited on pages 2 to 24.

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 the purposes of our audit.

As described in note 1, 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 aspects 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, 1986 and the results of its operations for the period ended on that date.

Ernst & Whinney

Chartered Accountants

Kandy,
Sri Lanka.
13th March 1987.

PARTNERS: M.T.L. FERNANDO F.C.A., T.K. BANDARANAYAKE B.Sc. F.C.A.
K.H.K. WIJAYADASA 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 1985 through 1986:

	1985 US\$	1986 US\$
UNRESTRICTED CORE SUPPORT		
Aga Khan Foundation	100,000	125,000
Asian Development Bank	270,000	-
Australia	56,345	69,690
Ford Foundation	1,000,000	1,500,000
France	53,476	92,593
General Services Fund	15,000	7,500
Japan	29,127	61,082
Rocketteller Foundation	50,000	45,000
United Kingdom	135,456	147,290
USA	250,000	250,000
Rocketteller Brothers Fund	-	25,000
Netherlands (Staff Services)	-	54,029
Total Unrestricted Core Support	1,959,404	2,377,184
SPECIAL PROJECT SUPPORT		
ADB Philippines	96,410	153,589
ADB Indonesia	39,896	181,073
ADB Regional Studies	100,000	-
Ford Foundation- ICPRI	-	16,141
Ford Foundation- West Africa	25,000	-
Ford Foundation- Africa	-	24,233
Ford Foundation- Nepal	27,290	28,710
World Bank- IIMI/ IDI Workshop	19,140	36,677
UNDP- July Workshop	16,220	36,500
ADB Regional Seminar	-	17,000
IFAD- Pakistan	-	340,297
IFAD- Nepal	-	96,296
Sri Lanka- IBRD- Training Study	-	40,000
USAID- Workshop	-	30,681
Rocketteller- Workshop	-	32,055
Total Special Project Support	323,956	1,033,252
Other Income	28,530	213,760
TOTAL INCOME	2,311,890	3,624,196
APPLICATION OF FUNDS		
Restricted, unrestricted core, and special project operations	1,969,299	2,855,092
Capital (Non-expendable)	272,591	589,103
Working capital	70,000	180,000
TOTAL APPLICATIONS	2,311,890	3,624,196

THE INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE
DIGANA VILLAGE - VIA KANDY

STATEMENT OF ASSETS, LIABILITIES AND FUND BALANCES
AS OF DECEMBER 31, 1985 AND 1986

ASSETS			LIABILITIES & FUND BALANCES	
	1985 US\$	1986 US\$	1985 US\$	1986 US\$
CASH	865,778	786,955	Liabilities accounts payable	73,663 62,306
ACCOUNTS RECEIVABLE FROM DONORS	777,607	690,643	Grants applicable to succeeding years	1,090,184 856,242
FROM INTERNATIONAL STAFF	43,146	40,641		
FROM LOCAL STAFF	9,737	13,818		
OTHER INTERNATIONAL RECEIVABLES	30,732	63,701	FUND BALANCES	
OTHER LOCAL RECEIVABLES		2,340		
PREPAID EXPENSES	89,642	196,790	Investment in non-expendable assets	444,593 1,033,696
ADVANCES TO PROJECTS	63,422	113,197	Core operations	596,216 689,537
PROPERTY AND EQUIPMENT	444,592	1,033,696	Working capital	120,000 300,000
TOTALS	2,324,656	2,941,781		2,324,656 2,941,781

1986 Staffing

Sri Lanka, Headquarters

Office of the Directors

Thomas Wickham
Director General

Jennifer Cramer
Executive Assistant and Conference Coordinator

Aasha Goonasekera
Secretary

Surani Neangoda
Clerk Typist

Roberto Lenton
Deputy Director General

Shanthi Weerasekera
Secretary

F.E. Schulze
Director of International Programs

Leonie Perera
Secretary

Research and Professional Development Programs

Daniel Berthery
Agricultural Engineer

David Groenfeldt
Economic Anthropologist

Edward Martin
Agricultural Economist

Douglas Merrey
Social Scientist

Senen Miranda
Agricultural Civil Engineer

C.R. Panabokke
Agronomist

P.S. Rao
Systems Scientist

Leslie Small (until August 1986)
Agricultural Economist

Senarath Bulankulame
Research Associate

B. W. Bandara
Data Manager

Sujatha Akuressa
Clerk Typist

Sushani Gunawardena
Secretary

Dewaki Nugawela
Secretary

Sandra Paragahawewa
Secretary

Ameeta Perera
Secretary

Research and Project Assistants

Dewahuwa Project, Sri Lanka

P.B. Aluwihare

D.K.W. Dias

E.M.W. Edirisinghe

Ratnasiri Ekanayake

L. R. Perera

W.J.J. Upasena

Kalankuttiya Project, Sri Lanka

K.A. Hemakeerthi

H.M. Hemakumara

A.P. Keerthipala

R. Moragoda

Kirindi Oya Project, Sri Lanka

P.G. Somaratne

Ranapura District Anicut Project, Sri Lanka

B.R. Ariyaratne

T.H. Ariyaratne

N.S.B. Epakanda

Uda Walawe Project, Sri Lanka

K. Jinapala

Information Program

Robert Cowell
Communication Specialist

Pavithra Weerasinghe
Clerk Typist

Communication and Publication Office

Varuna Abeywardena
Printer Assistant

Shanthi Dissanayake
Publications Assistant

Sumith Priyantha
Typesetter

Norman Van Eyck
Graphic and Technical Artist

Editorial Office

John Colmey
Editor/Writer

F. C. Perera
Clerk/Typist

Library and Documentation Center

Ranva De Silva
Documentalist

Sareshmi Ratnawardena
Librarian

Amila Herath
Clerk/Typist/Library Assistant

Administration

Michael Jones (until August 1986)
Director of Administration

Shirley Ananugama
Secretary

Chamliani G. Jeneratne
Receptionist

S.M.E. Seneviratne
Stores Clerk

Accounts Department

Laksiri Abeyssekera
Chief Accountant

Ganuni Halvitage
Accountant

Ianaka Ekanayake
Accounts Assistant

Chanchala Kariyawasam
Secretary

Sriyani Keegal
Accounts Clerk

Kumudini Kulugammana
Accounts Clerk

Dmarshana Samarakoon
Accounts Clerk/Club Supervisor

Bernard Van Cuylenberg
Stock Control Clerk

Yvonne Weerasinghe
Clerk/Typist

Supplies Department

S. Senniappan
Supplies Officer

Sumedha Abayaratne
Clerk/Typist

Upali Karunanayake
Purchasing Assistant

Travel & Transport Department

Mohan Abayasekara
Travel Officer

M.L. Cassiere
Transport Officer

Joyce De Silva
Clerk/Typist

Personnel Department

T.K.O. Bahar
Personnel Officer

Shalinie Daulagala
Clerk/Typist

Liaison Office, Colombo

C.W. Weeraratne
Liaison Officer

Maureen Coenraad
Secretary

Ranjini Molligoda
Secretary

Nihal Silva
Junior Clerk

Pakistan

James M. Wolf
Director

Michael Jones
Director of Administration

D. Hammond Murray Rust
Irrigation Engineer

Edward J. Vander Veldie
Geographer

Indonesia

S.H. Johnson, III
Resident Scientist

Jenny Hadi
Secretary

Busra Leman
Assistant Team Leader

Research Assistants

B. Affandi
Bambang
Imam Chaerun
Darno
R. Mulyono
Nurhayanto
Nyoto
Rusyan
Soenaryo
D. Soepriyanto
Soewitno
Supriadi
Sutrisno
Suyanto
Taryono

Nepal

Prachandra Pradhan
Resident Scientist

Robert Yoder
Resident Scientist

Mahesh Pant
Social Scientist

Surendra Raj Shrestha
Administrative Officer

Philippines

Alfredo Valera
Resident Scientist

Danilo Cablayan
Research Associate

Miriam Gesmundo
Clerk Typist

Gregorio Simbahan
Research Administrative Assistant

Research Assistants

Arturo Francisco
Henry Manguierra
Isidro Bernardino Teleron, III

IFPRI

Mark Svendsen
Agricultural Engineer
(On joint appointment to HMI and IFPRI)

List of Consultants

Name	Purpose
1. Charles Abernethy	IIMI's Africa Program
2. Marietta Adriano	Resource Mobilization study
3. Ramesh Bhatia	Resource Mobilization study in India
4. Donald Campbell	Irrigation Management Training Needs in Sri Lanka study
5. John Colmey	IIMI publications
6. Regina Cowell	International recruitment
7. Geert Diemer	IIMI's Africa Program
8. Kapila Goonesekera	Flow measurement devices
9. Alex Gunasekera	Computer hardware and software
10. Jane Johnson	Bibliographic database and library development
11. A. Maheswaran	Irrigation Management Training Needs in Sri Lanka study
12. Gladys Nott	Irrigation Management Training Needs in Sri Lanka study
13. Remy Pochat	Site identification for simulation model
14. Y. K. Shim	Resource Mobilization study in Korea
15. Jean Verdier	IIMI's Africa Program
16. Abe Waldstein	IIMI's Africa Program
17. Edward Wiser	Computer hardware and software

List of Collaborative Agreements

Page 49 of 50

Through Memoranda of Understanding

The Ministry of Public Works Republic of Indonesia	To cooperate in irrigation management development in Indonesia
The Water & Energy Commission Secretariat His Majesty's Government of Nepal	To establish an IIMI regional base in Nepal
The President Islamic Republic of Pakistan	To establish a Pakistan unit of the International Irrigation Management Institute
National Irrigation Administration Republic of the Philippines	For scientific and technical cooperation in research on irrigation systems management
Philippine Council for Agricultural and Resources Research and Development Philippines	For cooperation towards the improvement of irrigation management in the Philippines
The Arab Organization for Agricultural Development Sudan	For collaboration in areas of mutual interest for the purpose of agricultural development
Agrarian Research and Training Institute Sri Lanka	To cooperate in research, training and communications in irrigation management in Sri Lanka
Ministry of Lands and Land Development Government of Sri Lanka	For the establishment of IIMI
Ministry of Lands and Land Development Government of Sri Lanka	To implement the ADB-funded study on irrigation management and crop diversification in close collaboration and coordination with concerned Sri Lankan agencies
Post-Graduate Institute of Agriculture Government of Sri Lanka	To collaborate in post-graduate training of nominees from Sri Lanka in the field of irrigation management
The International Centre for Water Resources Management (CI-IGREF) France	To translate, publish and disseminate selected IIMI documents in French-speaking Africa
The Overseas Development Institute United Kingdom	To continue and expand the ODI <i>Irrigation Management Network (IMIN) Newsletter and Network Papers</i> and cooperate in the development of the database and Library services

The Economic Development Institute
World Bank
USA

To cooperate in conducting regional courses on
Planning and Management of Irrigation Projects

The International Rice Research Institute
Philippines

To cooperate in a program of research on irrigation
management in rice farming areas

Secretariat
of the International Commission on
Irrigation and Drainage
India

To cooperate towards enhancing the capacity
to exchange information and promote collaboration
among individuals and organizations involved with irrigation

Through Exchange of Correspondence

Asian Institute of Technology
Thailand

To collaborate in post-graduate training of students
from developing countries in irrigation
management-related fields.

International Food Policy Research Institute
USA

To collaborate in a program of research on food security
problems in Africa through irrigation investments, and to
strengthen and coordinate work in Indonesia and the
Philippines relating to irrigation investment strategies.

1986 Publications

Individual copies of the following publications are available free by writing to the Communication and Publication Office, IIMI. Publications will be sent by surface mail. Please be sure to include your complete address.

Brochure

International Irrigation Management Institute. 1986. *IIMI: A descriptive brochure*. (English and French.) Digana Village, Sri Lanka.

Research Paper Series

Small, Leslie E. and R. Barker. 1986. *Atelier commun IIMI/WAIS II sur les themes prioritaires de recherche pour le management de l'irrigation en Asie*. Document de Recherche No. 1. Digana Village, Sri Lanka. International Irrigation Management Institute.

Groenfeldt, D. (ed.). 1986. *Proceedings from a workshop on selected irrigation management issues, 15-19 July*. Research Paper No. 2. Digana Village, Sri Lanka. International Irrigation Management Institute.

Chambers, R. and I. Carrothers. 1986. *Rapid appraisal to improve canal irrigation performance: experience and options*. Research Paper No. 3. Digana Village, Sri Lanka. International Irrigation Management Institute.

Wolf, James M. and Douglas J. Metrey. 1986. *Irrigation management in Pakistan: Four papers*. Research Paper No. 4. Digana Village, Sri Lanka. International Irrigation Management Institute.

Case Study Series

Bautista, Honorio B. 1986. *Experience with organizing irrigators associations: A case study of the Magat River Irrigation Project in the Philippines*. Case Study No. 1. Digana Village, Sri Lanka. International Irrigation Management Institute.

Annual Reports

International Irrigation Management Institute. 1986. *Annual report for 1984-85*. Digana Village, Sri Lanka.

International Irrigation Management Institute. 1986. *Proposed program and budgets for 1987*. Digana Village, Sri Lanka.

Management Briefs

Rao, P. S. and A. Sundar. 1986. *Managing main system water distribution*. Management Brief No. 1. Digana Village, Sri Lanka. International Irrigation Management Institute.

Chambers, Robert. 1986. *Rapid rural appraisal for irrigation systems*. Management Brief No. 2. Digana Village, Sri Lanka. International Irrigation Management Institute.

Proceedings

International Irrigation Management Institute. 1986. *Proceedings of a workshop on participatory management in Sri Lanka's irrigation schemes*. Digana Village, Sri Lanka, 15-17 May.

Asian Development Bank and International Irrigation Management Institute. 1986. *Irrigation service fees*. Proceedings of the Regional Seminar on Irrigation Service Fees, Manila, 21-25 July.

International Irrigation Management Institute and Joint WHO/FAO/UNEP Panel of Experts on Environmental Management for Vector Control (PEEM). 1986. *Proceedings of the workshop on irrigation and vector borne disease transmission*. Digana Village, Sri Lanka, 13-17 October.

Newsletters

International Irrigation Management Institute. 1986. *Letter from the Director General* (2).

ODI-IIMI. 1986. *ODI-IIMI Irrigation Management Network Newsletter* 86 (1-3).