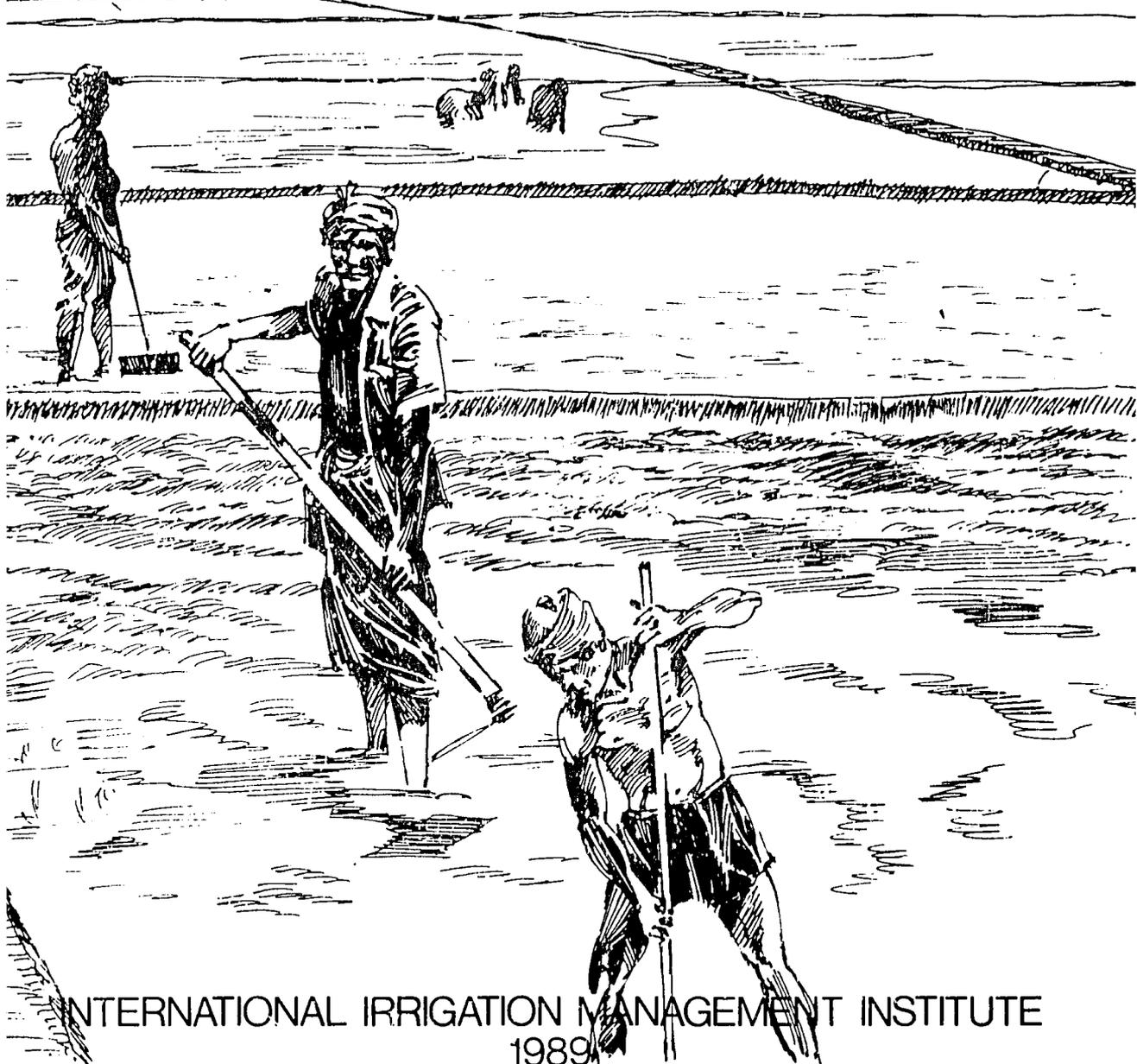


MANAGING IRRIGATION IN THE 1990'S

A Brief Guide to the Strategy of the
International Irrigation Management Institute



INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE
1989

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Further copies of this booklet and of the full version of IIMI's Strategy are obtainable from the headquarters address below.

IIMI Headquarters,
P.O. Box 2075, Colombo, Sri Lanka.

Introduction

This booklet is intended as a compact quick-reference guide to the **Strategy of the International Irrigation Management Institute**. Published in 1989, the parent **Strategy** was the result of a long series of methodical and searching consultations between IIMI and most of the leading national and international bodies which hold a stake in the Institute's work, or stand to benefit from it as a client, partner or both.

The **Strategy** also reflects the advice of many individual authorities on irrigation management and on agricultural development in general, including IIMI's own researchers and governing board members. The imperative to match IIMI's knowledge and resources to the real needs and expectations of their users and potential users governed the entire consultative process.

The **Strategy** identified these needs and expectations and endeavoured to set a realistic course along which IIMI's work should be steered during the next five to ten years.

Into the **Strategy** framework will be fitted IIMI workplans and accompanying budgets that cover shorter spans of time and are 'rolled forward' at regular intervals by a detailed review procedure.

Since the activities IIMI undertakes typically involve partnership with governments, with other policy-making or implementing bodies and with independent promoters of new knowledge and international funding, it is essential that such partners can see at a glance the nature of IIMI's aims, goals and targets in relation to their own. One of the functions of this Guide is to make such insight easy for busy people.

David Bell
Chairman
Board of Governors

Roberto Lenton
Director General

"A strategy . . . should describe the most desirable vision of an organization's future, outline the essential elements of the course it intends to follow to realize that vision and provide justification for the intended course."

Selcuk Ozgediz
Management Advisor,
Consultative Group on
International Agricultural
Research

The Need

The irrigation 'miracle'

About 15 percent of the world's total area of cultivated land is irrigated: of this land more than 70 percent is located in the world's developing regions. The productivity of irrigated land can be up to twice or more that of ordinary land. In South Asia, for instance, less than a quarter of all available agricultural land is irrigated but this portion provides the majority of the region's food harvest.

The 'Green Revolution' in Asia, during the 1960s and 1970s, owed its success to irrigation.

The 'Green Revolution' in Asia, which triggered phenomenal growth in agricultural productivity, income and other benefits during the 1960s and 1970s, owed its success to irrigation. With similar gains in view, many billions of dollars are today being invested in new irrigation schemes (or in restoring or expanding existing schemes) in countries throughout the world's developing regions.

The management gap

In many cases, however, the desired benefits of irrigation (particularly the higher crop yields that were anticipated) fall far short of expectations. Investigations have shown that recurring obstacles to successful irrigation include:

- erratic or unfair distribution of water resources,
- deficits between financial inputs and returns,
- premature breakdown of physical facilities,
- organizational flaws at different levels,
- insufficient information or back-up support for farmers,
- lack of well-trained irrigation managers,
- growing conflicts with other land and water uses, and
- negative environmental impacts.

In other words, what too often seems lacking is the wisdom to manage new and existing systems properly.

The irrigation challenge

Such deficiencies mar the efficient operation of existing irrigation systems and cast doubt on the returns from future schemes. Their impact is most sharply felt by already disadvantaged Third World farmers who (along with entire rural communities) depend heavily on reliable irrigation for their livelihood and prospects of advancement.

Despite these evident drawbacks, investment in more irrigation schemes — large and small — continues apace. With the world's population expected to double by the middle of the next century, and incomes rising, food needs will continue to rise sharply in the future and it is hard to see how these can be met without such investment. The demand for new or expanded schemes is unremitting, yet the supply of available land and water is increasingly limited.

Again, the signs are that a large part of the solution lies in wiser use of land and water, and of the technical and human resources involved in irrigation. The average crop yield from irrigated land in Japan, for example, is more than twice that from comparable land in India, a striking difference that cannot be accounted for in terms of technological advantage or higher investment alone.

Raising the productivity of irrigated areas to universally higher standards through better management is one of the greatest challenges world agriculture faces today and in the future.

Hidden harvest

Farmers are by no means the only beneficiaries of the improvements successful irrigation can bring. Irrigation means more than just the delivery of water for the production of crops. Directly or indirectly, it can create employment and service enterprises, raise incomes, attract investment and foster stability and food security in communities of every size, ranging up to nations as a whole. This hidden harvest can amount, in many cases, to a more significant economic and social boon than the harvest that is brought home or to market from the irrigated farm.

Irrigation has its indirect costs, too. It can bring in its wake serious public health problems such as epidemics of water-borne diseases. Salinization and water-logging of soils are other notorious consequences of poorly managed irrigation systems, that lead to the abandonment of thousands of hectares of once-productive land each year and can impoverish whole communities.

It is clear that better irrigation management has a key role to play in coming to grips with all these complex yet pressing issues of cost and benefit. It was to help meet this challenge that IIMI, the International Irrigation Management Institute, was founded.

The solution lies in wiser use of land and water, and of the technical and human resources involved in irrigation.

Irrigation management has a key role to play in coming to grips with all these complex yet pressing issues of cost and benefit.

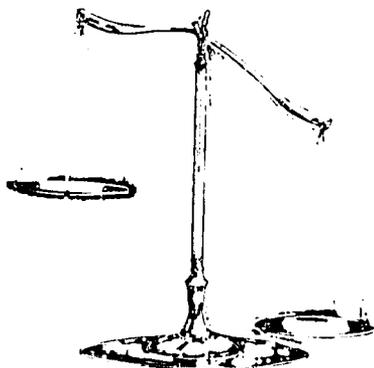
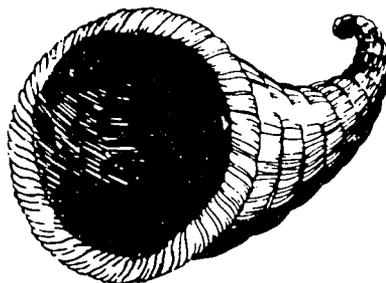
Irrigation Management Now

The foregoing section points out the evident need for stronger and better irrigation management in the world's developing regions. In formulating an institutional strategy showing how it can best help achieve that need, IIMI must weigh external factors (such as where the important gaps in practical knowledge exist, how far other organizations are able to fill that gap, and who is intended to benefit from such improvements) and internal factors such as IIMI's own strengths, mandate, and limits. From this process a mission statement emerges, which sets goals towards which the strategic planning of the Institute's work can be directed.

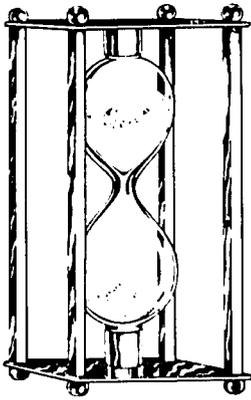
Where new knowledge is needed

As IIMI sees it, there are four key areas of concern where research and development in irrigation management can bring about significant improvements:

PRODUCTIVITY The average productivity of tropical cereal crops is much less than half the maximum possible under ideal irrigated conditions. This shortfall is closely linked to shortcomings such as water leakage or wastage, bad control or timing of water deliveries, and a reluctance (itself a reaction to uncertain water supplies) on the part of farmers to try out different crops and techniques that might boost their returns. Better irrigation management can help remedy these flaws.



EQUITY Harvests on farms at the head (nearest the source) end of some irrigation systems can regularly be as much as five times greater than those at the tail end. Studies have shown that tail-end farmers frequently not only get less water less steadily or often than their crops need it, but also have lower incomes, fewer benefits in relation to labor costs, weaker influence in their communities, and less access to services in general. Such multiple deprivations are not inevitable. Many of these effects could be warded off by better management.



SUSTAINABILITY Properly designed and managed irrigation systems should last almost indefinitely yet examples of long life are rare. Several factors (often combined) threaten sustainability, including physical factors such as contamination of soils, organizational factors such as inability on the part of maintenance departments to cope with system deterioration, and financial factors such as underspending on the many inputs systems needed to function routinely or to expand. In the latter case, participants can easily lose their motivation to persevere in maintaining efficient systems. Good management skills can help tackle all these obstacles to sustainability.

QUALITY OF LIFE Irrigation can cause many environmental and social changes. For instance, by enabling the land to support more people irrigation frequently causes immigration and settlement of new populations. Irrigation water can introduce serious pests and diseases to areas formerly free of them. Heavier crops on irrigated land mean more time spent tending them: impacts on family life, especially on women and children, are likely to be considerable. Such considerations call for sensitive management aimed at maximizing benefits and minimizing adverse impacts.



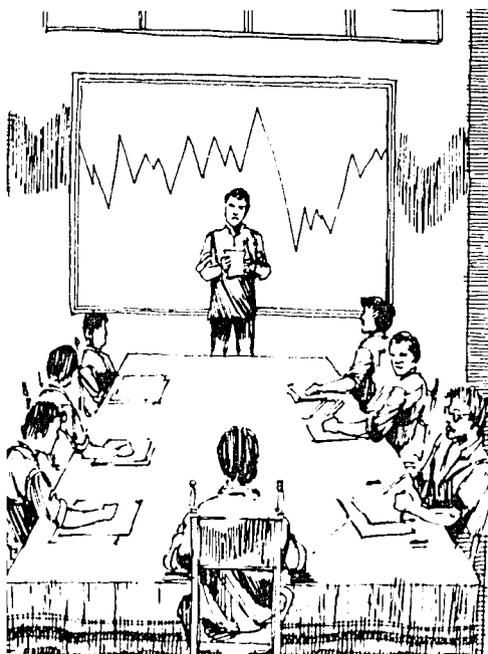
What others do

Various other international or national bodies are involved in irrigation management or in closely related fields.

Examples on the **research** front of multidisciplinary programs and projects based on a systems approach to irrigation management are relatively few, though specialized institutions engaging in single-discipline studies on isolated aspects of the subject exist in many countries.

In countries with large commitments to irrigated agriculture, such as Pakistan, Egypt, the Philippines, and India, there are projects with greater emphasis on applied management. Examples include Pakistan's Mona Project, the Egypt Water Use Project, and the joint work of the National Irrigation Administration and the International Rice Research Institute (IRRI) in the Philippines.

Irrigation management **training courses** are offered in many places around the world but courses that deal with the subject 'in the round' rather than



In-service training in water management has become a reality in several developing countries.



in part under separate physical, agricultural or social science headings, are available only in a few institutes, mostly in industrialized countries.

In-service training in water management has become a reality in several developing countries in recent years. In India several new Water and Land Management Institutes have been established for this purpose. A course on management of irrigation projects has been launched at Mananga, Swaziland, while courses sponsored by U.S. and Australian universities have become available to irrigation management trainees *in situ* in various parts of Asia, the Pacific, and North Africa.

Information exchange systems and information databases relevant to the irrigation manager exist at:

- the International Commission for Irrigation and Drainage headquarters in New Delhi, India, which maintains a large hard-copy library and publishes an annual bibliography;
- the Overseas Development Institute, London, which disseminates a newsletter and professional papers to an international network; and
- the Commonwealth Agriculture Bureaux International (based at Wallingford, U.K.) which publishes regular periodicals of abstracts, also available as an on-line service through host databases such as DIALOG.

Integrated programs combining research, training, and information aspects of irrigation management include FAO's International Support Programme for Farm Water Management, the Department of Irrigation Water Management within IRRI, and ISPAN — Irrigation Support Project for Asia and the Near East, financed by USAID.

Partners in sustainable development

Many of the international agricultural research centers associated with or within the CGIAR system (see page 7) are now planning or are already involved in research aimed at rendering systems sustainable under marginal environmental conditions.

As noted above this systems approach means integrating work on such varied topics as dryland ecology, agroforestry, soils science, the management of living aquatic resources, livestock management,

pest management, and crop research to obtain a true picture of the potential and the limits of food production under such intricate conditions. In many parts of the world, irrigation management is likely to be a key element in this picture.

More links among IIMI, the CGIAR 'family', and allied centers of excellence — as well as between this group and the wider research community — are therefore seen as a useful step towards improving prospects for sustainable growth in food production in developing regions, without net adverse effects on the environment or on social and economic development.

In general, IIMI policy will be to work in harness with other organizations with which it has interests in common and to ensure that its own distinctive contribution to progress in irrigation management boosts and complements the work of others.

Emerging issues and trends

A multidisciplinary approach to irrigation management problem-solving becomes more and more essential as new issues and trends emerge which (as the following examples underline) can best be addressed by crossing conventional boundaries between research disciplines and levels of technology.

Diversifying resource use while integrating resource management is a clear overall trend emerging in the context of agricultural *vis-a-vis* environmental sustainability in developing regions. The past emphasis on maximizing productivity under high-input, highly intensive farming conditions using the most productive lands is giving way in many places to new tactics aimed at tailoring varied combinations of land and resource uses (such as agroforestry, silvipasture, fish-farming) to the limited supporting capacity of the marginal or fragile lands which must increasingly bear production burdens as human populations grow and shift.

An integrated management approach, which looks at whole resource systems rather than individual components, is now recognized as a key means to achieve such a marriage between human needs and environmental stability.

Within the discipline of irrigation management itself, there is a growing trend towards **farmer**

The CGIAR, or Consultative Group on International Agricultural Research, is a donor support group with headquarters at the World Bank in Washington, D.C. The centers benefiting from CGIAR support are as follows:

CIAT — International Center for Tropical Agriculture, Colombia

CIMMYT — International Maize and Wheat Improvement Center, Mexico

CIP — International Potato Center, Peru

IBPGR — International Board for Plant Genetic Resources, Rome

ICARDA — International Center for Agricultural Research in the Dry Areas, Syria

ICRISAT — International Crops Research Institute for the Semi-Arid Tropics, India

IFPRI — International Food Policy Research Institute, Washington, D.C.

IITA — International Institute of Tropical Agriculture, Nigeria

ILCA — International Livestock Center for Africa, Ethiopia

ILRAD — International Laboratory for Research on Animal Diseases, Kenya

IRRI — International Rice Research Institute, the Philippines

ISNAR — International Service for National Agricultural Research, the Hague

WARDA — West Africa Rice Development Association, Ivory Coast

Among the "non-associated centers"

IBSRAM — International Board for Soils Research and Management, Thailand

ICIMOD — International Center for Integrated Mountain Development, Nepal

ICIPE — International Center of Insect Physiology and Entomology, Kenya

ICLARM — International Center for Living Aquatic Resources Management, the Philippines

ICRAF — International Council for Research on Agro-Forestry, Kenya

IIMI — International Irrigation Management Institute, Sri Lanka



management of irrigation systems, a movement of responsibility for irrigation management away from official agencies and into the hands of the user. This trend has been encouraged by governments and donors, because it could usher in new benefits in terms of sustainability, equity, and other desiderata.

However, the transition is not simple and much research will be needed to help make farmer management an effective standard procedure under very varied societal conditions.

Enlisting the benefits of **modern information technology**, such as microcomputers to share the irrigation manager's everyday problem-solving burdens, is yet another significant emerging trend. An example is the development of numerical modeling techniques to improve the operation of main canals in irrigation systems in India and elsewhere. Broader uses, such as the improvement of communication links between managers in agency headquarters and those in the field and the development of data banks to aid analysis leading to operational improvements, are also spreading.

In view of the growing need to factor into management planning an increasing number of new elements to achieve an integrated picture of resource use options in balance with socio-economic and environmental realities, it is foreseen that the role of the microcomputer in irrigation management will grow to much greater prominence in the future.

Solving resource conflicts is an important challenge to the irrigation manager and likely to become more so as the demand for water for purposes other than irrigation (for drinking and other household uses, for livestock watering, for hydroelectricity and so on) becomes more pressing.

The growing complexity these and other trends and issues impose on the work of today's and tomorrow's irrigation manager means that **new kinds of management training** facilities and courses are needed to equip trainees with far more than the technical and engineering skills typically offered in the universities and technical colleges of developing countries under the heading of irrigation studies. New directions in curriculum development are being pursued in some quarters but many trainees still have to undergo the expense and upheaval of study overseas. Here, too, innovative research can be put to essential use across the broad front of curriculum design in developing regions.



As these complex factors emerge, each country with substantial irrigation will need to develop a **research-based innovation system**, to provide a continuing basis for solving the stream of new problems that will inevitably arise in the future. It is IIMI's purpose to help in building such national research-based innovation systems.

Inside IIMI

Established in 1984, IIMI is an independent, international nonprofit organization with its headquarters in Sri Lanka. Since its foundation, it has progressively decentralized its operations through regional and country programs operated at present in more than 10 countries in various parts of Africa and Asia (see map, page 28). All IIMI activities are unified by a common program of work, and in formulating that program the Institute is mandated to place priority on activities which:

- promote multidisciplinary, collaborative research based on fieldwork in real irrigation systems;
- solve real problems;
- maintain excellence;
- strengthen national irrigation management agencies; and
- help reduce poverty, promote social justice, and improve the situation of disadvantaged groups.

IIMI is the first world body set up specifically to promote irrigation management concerns. Its creation grew mainly out of a debate that emerged in the early 1970s within the Consultative Group on International Agricultural Research (CGIAR), which supports a wide network of major resource centers around the world dedicated to collaborative field research and agricultural development.

Such centers typically link researchers and institutions in less-developed countries to international research at the location of the center, and to researchers in the premier institutions of the world concerned with the particular subject matter. The success of this approach in a variety of cases including rice, wheat, maize, cassava, and several other crops and agricultural problems, prepared the ground for a new enterprise dedicated to irrigation management, as the realization grew that a serious and widening gap existed between the expected and the actual results of irrigation development.

Who benefits

In view of their position as the group which stands in most urgent need of irrigation management improvements and stands to lose most by their lack, the ultimate beneficiaries of such improvements are the rural poor whose livelihoods depend on irrigated agriculture.

To contact and serve so big and diverse a constituency directly would be far beyond any international organization's practical scope or credentials. Most of IIMI's actions toward on-the-ground progress in irrigation management will naturally be made in step with and through partner and intermediary bodies such as:

- irrigation management organizations,
- policy-forming organizations,
- water users organizations,
- research institutes,
- universities and training establishments, and
- national consultant organizations.

Partnership with nations

Built into IIMI's founding principles is an obligation to strengthen national institutions by working through and with them at every stage of program development and implementation. IIMI labors to help its national partners build effective, adaptable and lasting irrigation management instruments of their own.

Finance

IIMI was established by, and secured finance from, a specially assembled international Support Group of funding sources. The Support Group at present consists of:

The Governments of Australia, Canada, the Federal Republic of Germany, France, Japan, the Netherlands, the United Kingdom, and the United States of America and the Aga Khan Foundation, the African Development Bank, the Asian Development Bank, Ford Foundation, the International Development Research Center (IDRC), the International Fund for Agricultural Development (IFAD), the Rockefeller Brothers' Fund, the Rockefeller Foundation, the United Nations Development Programme (UNDP), and the World Bank.

Strengths and limitations

IIMI is specially fitted to act as a research and development leader and partner in the field of irrigation management by reason of:

- its international status and recruiting power,
- the wide overview of its subject it derives from its multicountry programming,
- the credibility and expertise it builds through its sustained presence in selected countries, and
- its emphasis on partnership and practical problem solving.

These strengths are combined in flexible, multidisciplinary programs backed by adaptable permutations of unrestricted and restricted funding.

IIMI is not equipped to initiate programs of work in irrigation technology (see Definitions, page 11). Many other institutions are filling this need and,

IIMI labors to help its national partners build effective, adaptable and lasting irrigation management instruments of their own.

while IIMI may confer with them as a research partner on aspects of irrigation technology that overlap its own field of action, it does not intend to include this field among its primary concerns.

IIMI will, on the other hand, always be concerned to ensure that its research is not directed towards academic ends as products in themselves but towards new and practical management ways and means of enhancing the real performance and benefits of irrigation systems.

Mission into Strategy

IIMI's mission is to strengthen national efforts to improve and sustain the performance of irrigation systems in developing countries through the development and dissemination of management innovations.

Starting from a firm definition of irrigation management as a distinctive whole, the potential range of useful fields of activity within that whole is analyzed and cataloged in IIMI's Strategy Paper. A spectrum of concerns within this range upon which IIMI intends initially to concentrate its effort in view of its own comparative advantage is next identified.

Towards a managerial revolution

In many spheres of activity, recent decades have seen one form or another of managerial revolution. IIMI's declared mission can be interpreted as a sustained, international, collaborative effort to bring the benefits of such a revolution to irrigation in developing regions. IIMI should serve this process in the role of a center for developing management **innovations** through research and for helping national irrigation management institutions to originate, implement, and adapt such innovations independently under national and more localized conditions.

The business of developing management innovations through research will require as its raw materials:

- new knowledge gained from field research in specific environments; and practical ways to adapt and apply knowledge to every day conditions;

Definitions

IRRIGATION is the totality of the means employed by people to augment and control the supply of water to the soil, for the purpose of enhancing the production of crops.

IRRIGATION MANAGEMENT is the process that institutions or individuals employ to:

- set objectives for irrigation systems;
- establish appropriate conditions;
- identify, mobilize, and use resources to attain these objectives

... while ensuring that these activities are performed without adverse effects. This definition goes far beyond irrigation technology's straight forward water-delivery function and incorporates a variety of human, agricultural, and economic aspects of irrigation.

NATIONAL EFFORTS are actions undertaken in developing countries to improve irrigation system performance be they by governments, parastatals, non-government organizations, farmer associations or individuals.

INNOVATIONS bring about changes to improve system performance. These changes may be completely novel but often represent the introduction of a practice which has been successfully used elsewhere to the system in question.

PERFORMANCE is the results delivered by an irrigation system toward a set of objectives including productivity, equity, reliability, sustainability, profitability and quality of life.

A center for developing management innovations through research and for helping national irrigation management institutions to originate, implement, and adapt such innovations independently under national and more localized conditions.

- new knowledge on generic themes, gained from comparative studies of varied environments.

To make this knowledge effective as a means to strengthen the management capacities of national agencies, such research must be coupled with:

- action research to find practical ways to adapt and apply both kinds of knowledge to everyday conditions, as real management improvements;
- information dissemination, exchange and outreach; and
- management training.

In the conduct of all IIMI's research activities, regardless of category, a high premium will always be set on work which results in:

- ways to measure irrigation **performance** quantitatively and so judge the effectiveness of management innovations and changes by objective standards, as well as make valid comparisons among countries by reference to universally agreed benchmarks.
- hypotheses that can be objectively tested concerning trains of cause and effect in irrigation management processes. In due course, such research should enable IIMI and others to **predict the consequences** of interventions.
- methods for analyzing how the way irrigation systems are designed can affect the way they are **managed** and *vice versa*. Such methods will make it possible to determine the effects of physical and managerial constraints on better performance in particular environments.
- encouraging irrigation institutions to welcome **change and reform** in order that they can cope with the stresses of rising demands and take advantage of improved technologies.
- moves towards applying **modern management principles and practices** to the management of irrigation systems.

Seven themes

In developing IIMI's Strategy, IIMI identified thirteen key factors that have a strong bearing on the management and performance of irrigation systems in developing countries. These factors were derived on the basis of IIMI's definition of irrigation management (see page 11), and cut across all types of irrigation systems — agency and farmer managed, large and small scale, gravity and lift. Taking into account its present strengths and credentials, IIMI selected seven factors on which to initially concentrate attention. These factors, or program "themes", provide the focus for IIMI's program activities, and determine the Institute's structure and policy making in all its aspects.

The seven main program themes are:

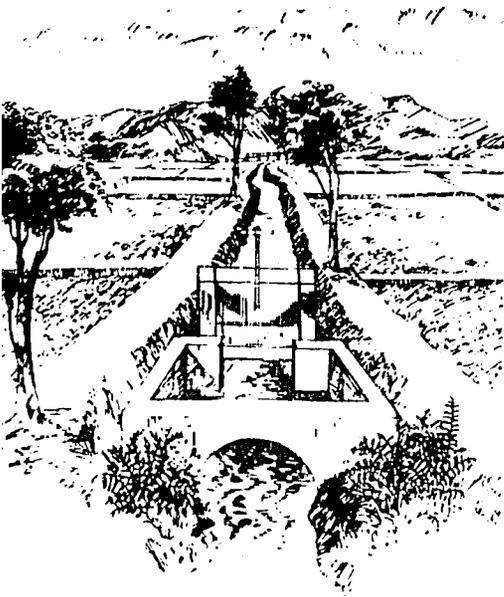
Institutions for irrigation management
Management of water resources for irrigation
Management of financial resources for system sustainability
Management of irrigation facilities
Management of irrigation organizations
Management of irrigation support services to farmers
Management of change in institutions for irrigation.

Designing effective irrigation institutions

Under this heading, IIMI will concentrate on institutional helping to determine the most appropriate institutional conditions for managing irrigation systems.

This will involve research on such issues as the merits of schemes run by central management agencies versus those managed by farmers; or those that treat farmers as tenants as contrasted with those that give farmers transferable land titles. Of particular importance will be the examination of the impact of such fundamental institutional choices on irrigation performance under varying environmental and social conditions. For those systems managed by central management agencies, research issues will include determining the numbers, quality, knowledge, and skills of agency personnel, assessing alternative information gathering arrangements and communication systems, and analyzing the advantages and disadvantages of different institutional mechanisms for cost recovery.

Other questions that often need to be asked are:
How should management agencies in charge of



IIMI sees new studies on main systems operations as a desirable growth area in research.

irrigation interact with one another? How are objectives set at the top and other levels? What mechanisms exist for monitoring actual performance and for reacting if things go wrong or fall short of expectations?

Managing water

This theme relates to physical processes in the irrigation system itself, from the operations of main canals right through to the delivery of water to farmers or farmer groups. Work on this theme requires awareness of crop needs for water, and of the constraints on water delivery that may be imposed by such factors as soil type or land shaping.

The past decade has seen more and more field studies concentrating on tertiary water distribution or on-farm water management at the point where water is delivered to the end-user. Analysts have tended to neglect operations at the other end, in main systems, yet when these are inadequately managed the impact is potentially harmful to the whole system.

IIMI therefore sees new studies on main system operations as a desirable growth area in research which could bear fruit in significant improvements in irrigation system performance.

Financial management

Having identified the management conditions that a system requires, there arises the linked question of mobilizing resources (usually financial) needed to secure and sustain these conditions. This issue is now of compelling concern to many irrigation agencies.

Spending on better irrigation systems can be recovered in many ways: by levying service fees on beneficiaries, or by creating opportunities for users to repay irrigation benefits partly in labor rather than cash, or by raising direct or indirect subsidies from national treasuries.

IIMI's interests lie not so much in the narrower question of how much should be collected and by whom, as in the broader interactions among finance, agency performance and overall system performance with system sustainability as the ultimate aim.

Managing facilities

Like any other man-made thing, irrigation facilities deteriorate physically.

Structures may rust or be wilfully damaged. Weeds grow and sediment accumulates in canals. Animals, vehicles, garbage, and other sources of interference deform the banks and beds of canals, often preventing systems from performing to the intended standard.

Management responses take the form of maintenance programs, rehabilitation schemes or both. The objective in either case is to keep a system in approximately the condition it was in when it was first constructed. However, rehabilitation can provide additional benefits since it can present an opportunity to upgrade and update systems that have been operating for many years — in other words, to boost the performance of old systems to new, higher levels.

Managing irrigation organizations

Irrigation management includes not only management of water but also management of people and management of information. The emphasis of many organizations in developing countries is on **administering** irrigation systems with the principal aim of supplying water as an input to agricultural production, according to established rules and procedures. But the essence of **management** is to monitor outputs no less than inputs, to look at the irrigation process from beginning to end and gather feedback on which to base useful improvements in real time operations.

Shifting from an administrative mode to a management mode in operating systems by enhancing the managerial capacity of decision makers and rank-and-file personnel of irrigation agencies, is the key to achieving and **sustaining** high levels of irrigation system performance.

Drawing on its experience, IIMI proposes to focus special attention on encouraging this shift in attitudes. It will help develop methodologies for monitoring and evaluating management performance — the performance of the agency itself — as a means towards self-improvement. And it will work to point out ways in which the accountability of agencies (especially to farmers) and the flow of information within and between them can be improved.



Managing support services to farmers

Governmental institutions play a variety of roles to help develop and manage irrigation systems in developing countries. In some instances, governmental agencies are directly responsible for the management of irrigation. In other instances, governmental institutions play more indirect roles. These roles include promoting irrigation development through the provision of credit and technical assistance services to farmer groups or individuals; assisting in the rehabilitation and reconstruction of systems owned and operated by farmers; and helping improve operations, maintenance and management standards through water management advisory extension services and allied mechanisms. In addition, governments are generally responsible for coordinating the provision of seeds, fertilizers, credit, and other inputs required to increase the productivity of irrigated agriculture.

In a growing number of cases (see "managing change" below) government agencies originally established to play a direct role in the development, construction, and management of irrigation systems are now being asked to change their approach and play an indirect role geared towards providing support services to individuals or farmer groups responsible for farmer-managed systems. Such indirect roles, however, require management approaches as sophisticated as those required by irrigation agencies directly responsible for water supply and distribution. For example, they require the organization of credit and technical assistance services; the mobilization of labor and financial resources from farmers; and the coordination of delivery of inputs and services provided by different agencies and private sources. They also require skills — in dealing with large numbers of small farmers, in working with farmer organizations and NGOs, and in recognizing the role of small farmer-managed systems in agricultural production — which staff of traditional irrigation agencies and departments frequently do not possess. The need for management innovations and management training in the development of more effective irrigation support services to farmers is therefore very great.

In addressing the management of irrigation support services to farmers, IIMI intends to build on its work to date in Nepal, Sri Lanka, and other countries on improving the effectiveness of governmental assistance to traditional farmer-managed irrigation systems. Small irrigation systems built and managed by farmers

exist in many of these countries, and in some (such as Nepal) they represent a majority of the irrigated areas.

Managing change

The themes so far described mainly concern aspects of performance and management within established institutional frameworks. There are times when it becomes important to make fundamental changes to such frameworks or to introduce new ones.

In the process some institutions may be abolished altogether. Or they may have some of their responsibilities redefined, some perhaps removed and relocated in allied institutions where they can be more effectively carried out.

The process is similar to modernization of the physical irrigation system: amongst other things, it involves returning to the system design stage and establishing new management conditions. It is, however, far more difficult to achieve in many cases because established groups and institutions may resist the change.

A current example is the trend towards the 'turn-over' of management functions that were previously discharged by government agencies, to farmers or farmers' organizations. This process will be the initial focus of IIMI's work in this thematic area, since many countries are actively pursuing policies in these directions.

Strategy into Program

The declared themes or areas of concentration identified in IIMI's strategy will be put into practice in the Institute's program and project development through a combination of ways and means that has already been outlined (see *Towards a managerial revolution*, page 11). The nature of these ways and means will have a fundamental impact on the way IIMI itself is structured, funded, and run.

Collaborative field operations

In the future (as now) IIMI's fieldwork will typically involve acting in close partnership with national institutes or management agencies or both to solve specific problems in unique environments. The day-to-day running of such projects will be the job of professionals in IIMI's country units (see page 24 for the methods used to select appropriate countries and partners).

Twin features of any IIMI field operation will be a study phase aimed at understanding problem areas in a given system, and an implementation or innovation phase whereby proposed changes are put to practical test in pilot areas and tuned to the needs of the system in question.

Before embarking on collaborative field projects, IIMI will strive to ensure that the projects' objectives fit well within the thematic channels of its strategy; ideally, every project undertaken will contain elements of all or most of IIMI's thematic concerns.

Timely forward planning of projects will be regarded as essential and project objectives, costs and workplans will be determined well in advance of action. The majority of IIMI's project costs will normally be met from the restricted portion of the Institute's budget (see page 26).

Twin features of any IIMI field operation will be a study phase aimed at understanding problem areas in a given system, and an implementation or innovation phase whereby proposed changes are put to practical test in pilot areas and tuned to the needs of the system in question.

Thematic research

When evaluating and comparing the results of collaborative field operations, IIMI will also be consciously gathering them (together with information received from other sources) into a body of overview knowledge from which further conclusions and problem-solving expertise can be drawn, of general yet direct and practical relevance to irrigation managers as a community.

Since the selection of field projects will have earlier been guided along the lines of strategic themes, thematic research will naturally gather up the same strands and weave them together with other knowledge to make a net of compatible firsthand and acquired observations and recommendations that can be more widely cast.

Ultimate objectives of such thematic research will include a capacity to predict consequences of change in irrigation systems, to establish objective standards for measuring the performance of irrigation systems and institutions, and to trace recurring patterns of cause and effect that influence irrigation system design, administration, and on-site operation.

Among the substantive outputs of thematic research will be *state-of-the art* reviews of IIMI's seven major thematic concerns, aimed at labeling important trends; putting irrigation managers, researchers, and policy-makers in the picture of important developments; and identifying gaps in knowledge and outstanding research challenges.

Management training

The need for good training and retraining programs for irrigation managers is growing swiftly with the realization that nothing less than a 'management revolution' in irrigation will allow this technology to achieve its full potential as a vital engine of the development process.

Research can produce the necessary innovations and improvements in principle but how are these findings to be translated in practice? IIMI's strategic answer is to make management training available to operating partners worldwide, aimed especially at middle or top level managers in existing irrigation agencies whose established seniority will ensure the rapid transfer of new know-how into everyday working procedures.

Other priority target groups are trainers and researchers who are themselves in a position to set their own cycle of innovation and adaptation in motion within their own country or region.

Demand for up-to-date training far exceeds supply so choices must be made from among different subject areas and target groups on which IIMI could concentrate its training services in the countries where it operates.

IIMI's training approach excludes the aim (already amply served by other bodies) of developing general irrigation skills or understanding of irrigation technology. In keeping with its mission, IIMI will emphasize **management issues** and the process of boosting the capacity of national organizations to handle them confidently.

IIMI's training activities will combine direct and indirect approaches, the direct part consisting of training seminars conducted by IIMI professionals and aimed mainly at practicing irrigation managers.

The indirect component — training support for national trainers will be the more usual approach and will take various forms, specifically:

- advice on curriculum development,
- origination of training materials of wide relevance, and
- assistance in professional development of national training staff.

Nothing less than a 'management revolution' in irrigation will allow technology to achieve its potential.

IIMI's strategic answer is to aim management training especially at middle or top managers in existing irrigation agencies whose established seniority will ensure the rapid transfer of new know-how into everyday working procedures.

Formal training will be backed by practical sessions under real field conditions.

IIMI in print

The range of technical or semi-technical print products IIMI intends to provide to its specialist and special interest constituencies, includes:

- Management Briefs. These summary papers will present major research findings to the middle or senior level irrigation official well placed to implement lessons in the field as components of policy.
- Working Paper, Technical Paper, and Newsletter series featuring materials derived directly from IIMI's field work or on occasion, commissioned from outside specialists under the IIMI Special Award scheme or a like arrangement. These short (20 to 80 pages) papers and newsletters will be distributed internationally and targeted mainly on the second IIMI category of readership (see Target Groups, above). They will review outstanding research findings, especially those of more global relevance.
- Book-length (100 to 400 pages) publications, summing up particular projects or research initiatives and designed to promote both the research and practical extension sides of IIMI's work. Guidelines, manuals and digests of standards for irrigation management practice are examples of this part of the Institute's publishing list, which will be targeted as above on the researcher, teacher or working-level manager with a professional or special interest in irrigation management.
- Journal articles for placement in world-listed specialist periodicals, newsletters for distribution to special groups (such as the existing network serving researchers into farmer management of irrigation systems) and proceedings of research seminars organized by IIMI, will also be produced with the support of the Information Office.

In all cases, formal training will be backed by practical sessions under real field conditions. Training objectives will be built into IIMI's collaborative fieldwork and thematic research work, to make sure that the ability of national participants to launch and complete their own projects has been strengthened by the experience.

Information support and outreach

IIMI's information outputs and information exchange ventures are aimed at three principal target groups:

- decision makers at middle and senior management levels, mainly in government ministries and major irrigation management organizations; people, in other words, who can swiftly put into practice the management innovations developed and recommended by IIMI and its partner bodies;
- managers and researchers in irrigation management organizations and in research and training establishments in the countries where IIMI works and elsewhere; and
- supporters in funding, partner and client groups who should be kept in the picture of IIMI's work, together with other international agricultural research centers whose work is related, directly or indirectly, to irrigation management.

IIMI will also provide more general information touching on its own activities and stating an authoritative view on broad issues concerning irrigation management as well as a large measure of product support for training and professional development programs.

In addition to continuing to build a comprehensive and accessible headquarters library and database, IIMI's library and documentation services will concentrate on working with peer institutions to develop and unify network and referral systems for exchanging information about irrigation management and related topics. Broad spectrum database and abstracting services are not, on the other hand, foreseen as an appropriate area of concern to IIMI: such services are already amply supplied by other bodies.

In the realm of public information, IIMI intends to reach out to more general audiences through media liaison efforts aimed at raising the profile of irrigation management in the eyes of the general public and of special interest groups such as development policy planners and lobbyists. Its special-interest journal and general 'corporate' literature such as its *Annual Report* will also be designed to cater to these sectors as well as to more technically oriented readerships. Audio visual products, particularly documentary and training videos, will form an increasingly important part of the range of the Institute's information products.

Country Operations and Partners

IIMI will engage in country operations at one or more of the following levels of involvement:

Nonresident operations in which IIMI undertakes intermittent functions such as seminars, workshops, information exchange or staff exchanges and encourages national participation in network research.

Resident operations in which IIMI fields resident IIMI senior staff to engage in collaborative fieldwork or training activities or boost research capacity by sponsoring nationals as research associates or fellows.

Major 'branch' operations which involve a multidisciplinary IIMI team capable of providing services across the full sweep of operational capabilities.

Multicountry or regional resident operations in which a group of IIMI staff is based in one country but also pursues activities in a number of neighboring countries. This arrangement is apt to apply to regions where the extent of irrigation in individual countries is not enough to justify separate national operations.

Choosing partners

Country operations will be designed to ensure that they contribute to the growth of national efforts to strengthen irrigation management, bring into the

Geographical scope

IIMI recognizes five major zones (see map at the end of this booklet) where its work will be concentrated. These zones are identified partly on conventional geographical grounds and partly in broad terms of irrigation types, terrains, and challenges.

These characteristics are described here and the map itemizes countries where IIMI presently participates in collaborative activities. Statistical information relating to population and to irrigated area within the total cultivated area is also included on the map for each zone.

SOUTH EAST ASIA

Agriculture: predominately rice farming under irrigation.

Climate: characterized by monsoon rains occurring in most cases twice a year, therefore supporting significant areas of rain-fed as well as irrigated crops.

Geography: typified by steep mountain systems giving rise to silty river systems and fertile alluvial plains and deltas. Dependence on irrigation in this heavily populated zone is significant, but recent

successes in raising rice production more swiftly than population growth in some countries has presented new management issues such as marketing and diversifying away from rice.

Major countries in this zone are Bangladesh, Burma, India, Indonesia, Kampuchea, Laos, Malaysia, Nepal, Sri Lanka, the Philippines, Thailand and Vietnam.

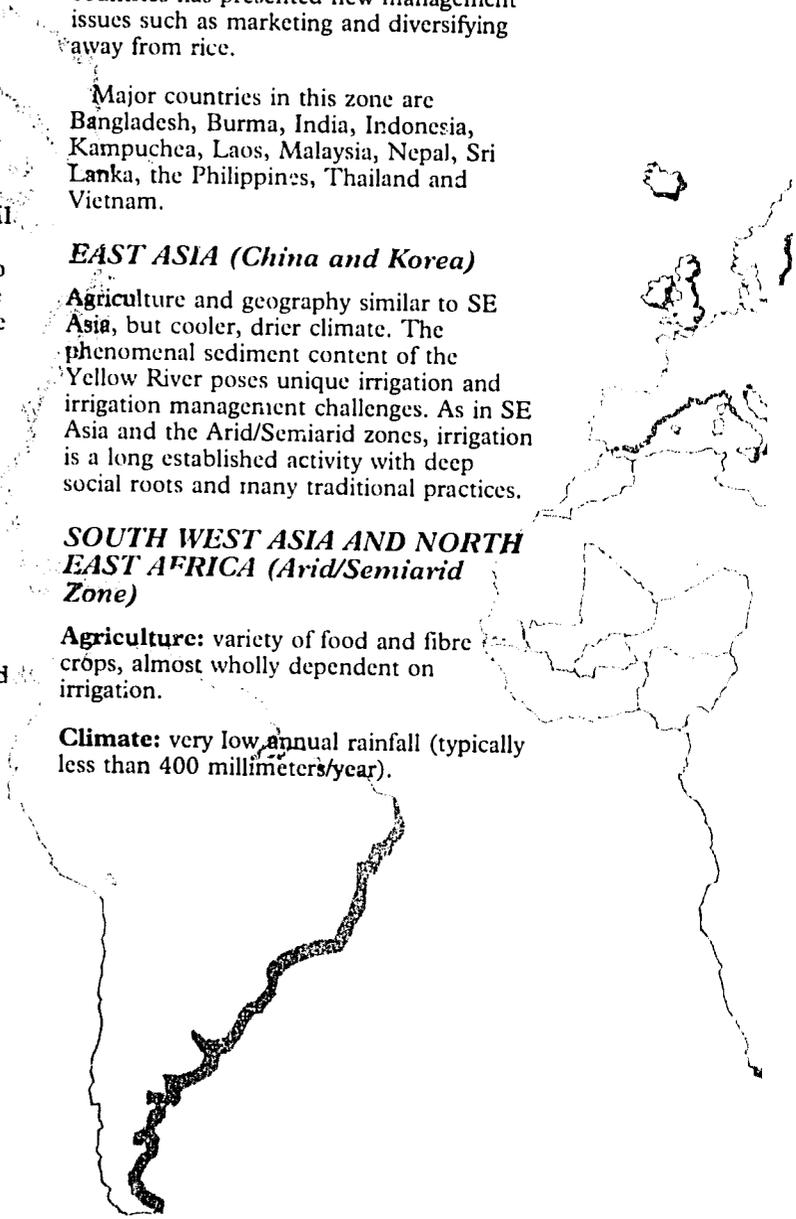
EAST ASIA (China and Korea)

Agriculture and geography similar to SE Asia, but cooler, drier climate. The phenomenal sediment content of the Yellow River poses unique irrigation and irrigation management challenges. As in SE Asia and the Arid/Semi-arid zones, irrigation is a long established activity with deep social roots and many traditional practices.

SOUTH WEST ASIA AND NORTH EAST AFRICA (Arid/Semi-arid Zone)

Agriculture: variety of food and fibre crops, almost wholly dependent on irrigation.

Climate: very low annual rainfall (typically less than 400 millimeters/year).



Geography: major rivers originating in mountain systems fringing the zone carry plentiful silt and have laid down deep, level and fertile soil systems.

Human populations, many descended from the earliest irrigation societies, crowd the irrigated areas. In many systems (e.g. the Nile) virtually all surface water resources have been captured and improved management to increase productivity per unit of water is the only way forward. Severe environmental and public health problems are associated with irrigation systems in some parts of this zone.

Major countries are Egypt, India (western states), Iran, Iraq, Pakistan, Sudan, and Syria.

AFRICA (minus Nile Valley)

Very varied food production systems, largely rain fed with irrigation concentrated on cash or export crops. A trend towards more irrigation for staple food production is now emerging out of a need for insurance against harvest failures under changeable climate conditions.

Unlike most parts of Asia, irrigation traditions and infrastructure are lacking in most parts of this zone so organizational i

mprovements and institution-building are key needs.

North African countries have more developed institutions for irrigation management than most other areas, but in West Africa the picture is changing fast.

LATIN AMERICA AND THE CARIBBEAN

Like Africa, much of this zone's agriculture is rain fed and irrigation (where it occurs) is concentrated on market crops. But substantial areas (e.g. NE Brazil, NW Peru, central Chile) exist where irrigation is crucial to basic food needs and is on the increase. In Central America and the Caribbean, irrigation is necessary to feed the population but as great rivers and alluvial systems are not a feature, management units (except in Mexico) tend to be small-scale. IIMI has no continuing activities in this zone at present but aims to develop interests in several countries by 1992.

Relations with industrialized countries

Though IIMI's paramount mission is to developing countries, it regards the experience of countries in the geopolitical 'North' where irrigation and irrigation management and research institutes have a significant role to play, as a source of valuable comparisons and lessons. Such countries include the Mediterranean states of Europe, the USA, the USSR, Japan, and Australia.

picture all the significant national organizations concerned with irrigation management, in any particular country, and bolster the objectives of IIMI's Strategy.

The operations will normally be set on course by a formal agreement between IIMI and the national government concerned, followed by a technical agreement (or series of agreements) between IIMI and key national organizations, establishing the detailed terms of reference of collaborative work.

National consultative committees will be set up comprising senior national authorities, IIMI specialists, and other interested parties. They will meet at routine intervals to monitor progress and ensure the work being done continues to match national and Institute objectives.

Partner profiles

IIMI will seek collaborative links with several different kinds of institutions in its country operations.

- **National agencies and research institutions** will naturally come top of the list, since they will make it possible to expand the scale of IIMI's mission far beyond project locations and to provide mechanisms for implementing innovations. Since any innovative research must be based on a thorough understanding of existing national agencies, there is an obvious advantage to working in harness with those agencies and studying their operation at close quarters. Such partnership also adds up to a training and knowledge transfer opportunity in its own right, since participating national staff learn about field research realities at first hand and have a greater insight into the results.
- Collaboration with other **international agricultural research centers** will be sought in the expectation that the total result of joint work with these peer bodies will be more than the sum of its parts. This is particularly expected of partnership with centers that work in fields that overlap with IIMI's (for instance, the International Rice Research Institute, IRRI) or work in terms of broad policy perspectives (eg: the International Food Policy Research Institute, IFPRI) or key factors of production (eg: the International Board for Soils Research and Management, IBSRAM).

- **Other centers of excellence**, such as scientific institutions, regional or international organizations centered or funded in industrialized countries, and consulting enterprises are important potential partners. They can make highly specialized expertise available to IIMI in certain areas where they have interests in common with the Institute, so increasing the flexibility of IIMI's operations.
- **International lending and donor organizations** directly finance numerous irrigation projects around the world and have a large influence on irrigation policy, design, and management questions. IIMI seeks to work especially closely with international or regional development banks.
- **Non-governmental organizations**, national and international, conduct many activities relevant to IIMI's mission and can be especially helpful partners when it comes to implementing innovations, such as moves towards farmer management of irrigation systems, at grassroots level.
- **National and international professional bodies**, such as the International Commission for Irrigation and Drainage (ICID), are of significant importance in promoting information exchange.

Criteria

IIMI will use several criteria to judge whether or not to initiate a country operation.

Ideal partners are countries where the authorities are **receptive** to the idea of collaborative work with IIMI and express a definite desire for IIMI to become involved. They should have a clear need for the benefits of collaboration and an existing sizeable and diverse **range and extent of irrigation systems**.

A degree of technical interest or an existing successful track record in innovative approaches to irrigation management would be a further advantage. Other considerations are the degree of readiness to enter into collaborative agreements shown by the administration of potential partner countries and the existence of sufficient donor interest and support to justify the effort of establishing and maintaining a country presence.

Program into Action

This concluding section foresees the operational implications of the strategy-forming process, or how and where IIMI will locate, structure, and finance its operations to achieve the various aims and courses of action declared in foregoing sections.

Organizational structure

In view of its strategic imperatives, IIMI's organizational structure will require molding so that it provides effective pipelines for:

- development of thematic knowledge and broader learning derived mainly from field project experience;
- effective implementation of field projects to the satisfaction of donors and project partners alike;
- a strong information program that can provide outputs of a more generally targeted nature than the location-specific project reports usually required by donors;
- timely preparation and submission of project proposals to potential donors and partners, to ensure a smooth flow of activities for project-oriented country units; and
- effective delegation of project control to project leaders in the field and heads of country operations, together with adequate arrangements to provide professional support to these fieldworkers when the need arises.

As a consequence of these requirements, IIMI's structure has been arranged in four main divisions:

- a *Programs Division*, responsible for thematic research, regional or multicountry projects, and training activities;
- a *Field Operations Division*, which deals with the Institute's country-specific collaborative field operations through a network of country offices;
- a *Pakistan Division*, catering to IIMI's major branch operations in that country; and
- a *Finance and Administration Division*, responsible for planning and directing the financial, purchasing, personnel, housing, and administrative support services of the Institute.

In addition to (and working in support of all) the four main Divisions, are the Offices of Information and Project Development.

Governance

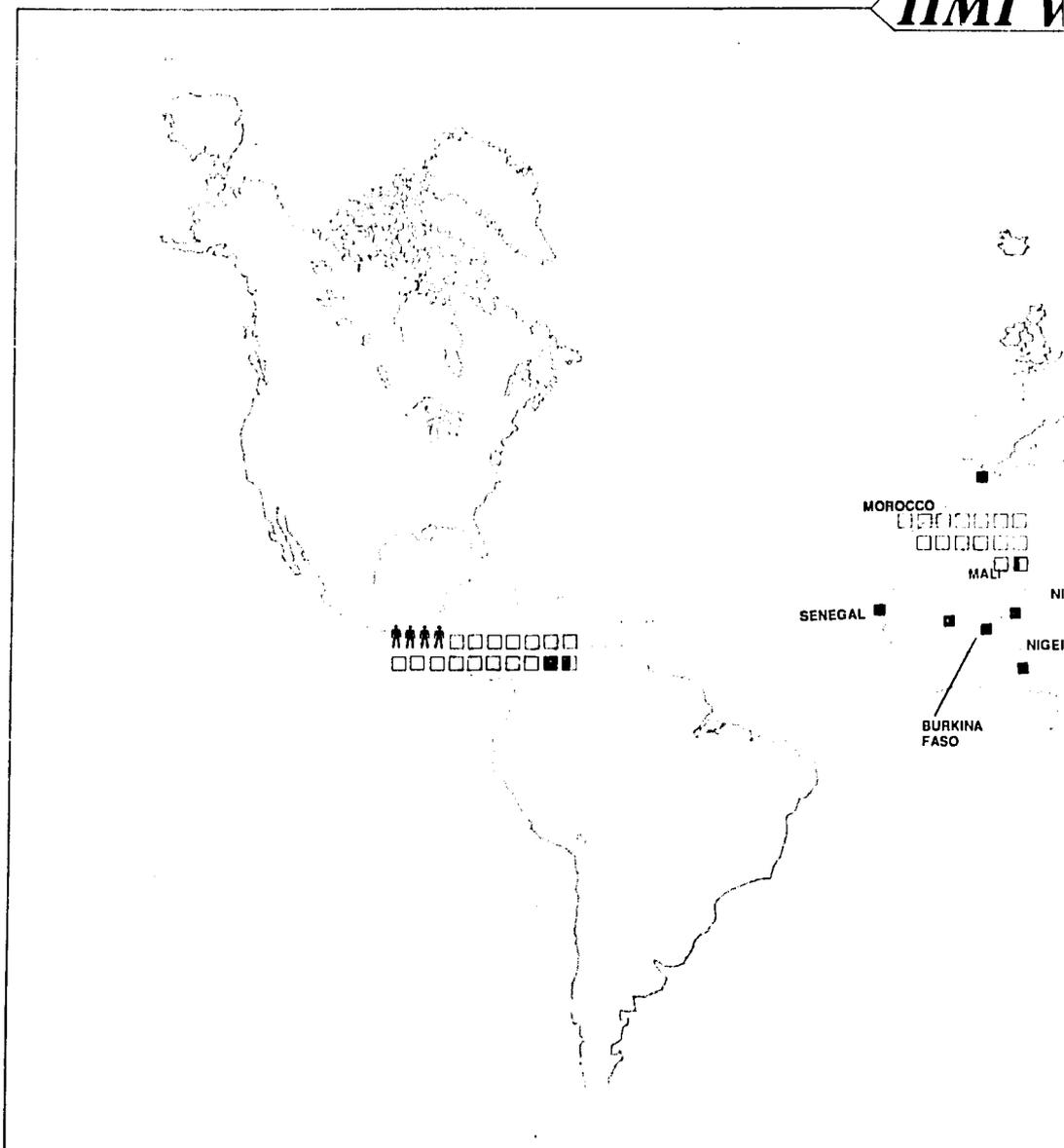
IIMI is governed by a Board which convenes annually to review the Institute's general performance and oversee the steering of its future course. At intervals between Board meetings, different sections of the Board of Governors meet in committee to consider outstanding program, finance, and management matters, make interim recommendations on the Board's behalf, and refer and report to the Board matters of major concern.

Funding pattern

Two types of funding make IIMI's work possible. **Unrestricted grants** are voted annually to the Institute by its Support Group and expended at the discretion of the Board and the Director General. This type of funding is a fundamental resource on which much of IIMI's thematic or overview research will depend for its effective performance and continuity; it can also be used to provide seed money for specific, novel avenues of field research.

The work of the Programs, Field Operations, and Pakistan division and the Information Office will be supported by a combination of unrestricted and **restricted** (or project) funding provided for specific tasks from bilateral, development bank or other sources. Restricted funding gives the Institute a special advantage over fixed-income organizations which have limited potential to undertake new initiatives. Normally provided in the context of some wider development project, such funding also helps ensure that IIMI's inputs are relevant to national development objectives and, conversely, helps ensure commitment on the part of IIMI's national collaborators.

IIMI's Board of Governors, Directorate, Finance and Administration Division and Project Development Office, will be funded from a proportional levy on all grants.



The map shows the five geographical zones selected in IIMI's Strategy as appropriate and distinctive units in which the Institute will operate. General characteristics of each zone are listed on pages 22 and 23 of this Guide. Symbols on the map are as follows:

- Population. Each person symbol represents a hundred million people.
- Total cultivated area. Each tile represents ten million hectares.
- Total irrigated area within cultivated area.

The rectangles on the map refer to locations where IIMI is represented at one level or another (see page 21).

