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Policy Paper No. 3

**Achieving High Performance:
Strategies for Operation and Maintenance
and
Rehabilitation and Modernization
of
Irrigation Systems**

IMPSA

IRRIGATION MANAGEMENT POLICY SUPPORT ACTIVITY

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Preface

THIS PAPER IS a product of the Irrigation Management Policy Support Activity (IMPSA). IMPSA is a programme to assist the Government of Sri Lanka (GSL) in the implementation of its accepted policy of participatory management in irrigation and settlement schemes, in order to improve productivity, profitability and equity in the irrigated agriculture sector.

IMPSA was initiated by the Ministry of Lands, Irrigation, and Mahaweli Development in association with the Ministry of Agricultural Development and Research. It is sponsored and financed by the United States Agency for International Development (USAID) through the Irrigation Support Project for Asia and the Near East (ISPAN) and is assisted by the International Irrigation Management Institute (IIMI).

For the execution of IMPSA, the GSL has set up an inter-ministerial advisory committee, the Irrigation Management Policy Advisory Committee (IMPAC), to provide both guidance for the implementation of IMPSA and a mechanism to achieve consensus among the Divisions and Departments of the concerned Ministries on the recommendations to be adopted and implemented by the GSL. IMPAC is chaired by the Secretary, Ministry of Lands, Irrigation and Mahaweli Development, and consists of the Secretaries and State Secretaries of the relevant Ministries, together with the Heads of the Departments and Agencies under them, in order to carry out the numerous studies and activities that will have to be undertaken.

Under the IMPSA Programme, ten Policy Papers are scheduled to be prepared and processed for presentation to the government within the project period. Each policy paper will be a concise statement of the recommendations of the IMPAC. The first policy paper already approved by IMPAC is entitled "Irrigated Agriculture and Irrigation Management: Vision for the Next Decade and Beyond." The second policy paper which has also been approved by IMPAC is entitled "Institutional Framework for Management of Irrigation Systems and Building Farmers' Organizations."

Chapter 1

INTRODUCTION

THIS DOCUMENT IS the third of the ten policy papers to be prepared under the IMPSA Programme. It is a synthesis of two Staff Working Papers on the issues related to this topic, i.e., strategies for operation and maintenance (O&M) and rehabilitation and modernization (R&M).

The purpose of this paper is to propose a set of guiding principles and feasible strategies for O&M and R&M of irrigation systems in Sri Lanka, which would contribute to achieving high performance in these systems in the future. The paper also sets out broad guidelines for the implementation of the strategies proposed.

It is expected that the members of the Irrigation Management Policy Advisory Committee (IMPAC) will review this paper and arrive at a clear consensus on its contents, including any changes or adjustments required. The final version will be the basis for policies to be recommended to the government.

1.1. The Basis of the Proposed Strategies

THE PROPOSALS MADE herein are within the framework of the government's new policy of "participatory management" and in line with the overall vision, broad guidelines, principles and objectives for the future direction of irrigated agricultural policy in Sri Lanka for the next decade and beyond, contained in IMPSA Policy Paper No. 1 which has been accepted by IMPAC.

This paper draws from reviews, comparisons and syntheses of research studies and also the past implementation experience of operation, maintenance, rehabilitation and modernization of irrigation systems, both local and international. The IMPSA team obtained insights and ideas from experienced senior officials of concerned agencies in preparing two Staff Working Papers (SWPs), 3.1 and 3.2, to support the preparation of this Policy Working Paper, through a series of panel consultations. Special panels constituted to review the draft SWPs assisted in finalizing them. These SWPs should be consulted for further details. Other perspectives on O&M and R&M were also obtained through Consultative Workshops organized by the IMPSA Secretariat where a wide cross section of farmers and officials involved in irrigation management, at different levels, expressed their views and opinions on the problems and issues involved. This Paper reflects to a considerable degree

on the suggestions made by the various groups for drawing up future strategies for operation and maintenance and rehabilitation and modernization of irrigation systems in Sri Lanka.

1.2. Structure of the Paper¹

THIS PAPER BEGINS with a brief overview of past experience in formulating and implementing operation and maintenance, and rehabilitation and modernization policies, both local and international. It includes a synthesis of the lessons learnt from past experiences and the future directions of irrigation management in the key area of O&M and R&M. In this paper, O&M and R&M are conceived as an integrated process. However, they are dealt with separately for clarity in presentation. It describes the strategies required for achieving high performance through O&M and R&M.

1.3. Concepts and Definitions

FOR THE PURPOSE of this paper, the terms "operation," "maintenance," "rehabilitation," and "modernization" are defined as follows.

- i. Operation refers to the use and manipulation of the system to achieve the water delivery objectives; short-term performance of a system is determined by how it is operated.
- ii. Maintenance refers to the routine daily, seasonal, or annual work required to keep the system in a condition that allows it to be safely operated and to be physically capable of fulfilling its water delivery functions. Both short- and long-term performances (sustainability) are a function of the quality of maintenance.
- iii. Rehabilitation refers to periodic programmes to carry out extensive repairs and technical modifications to bring a system back to a condition in which it can achieve its water delivery performance objectives safely, or can achieve newly defined objectives. The frequency and scale of rehabilitation requirements are a direct function of the quality of a system's operation and maintenance.
- iv. Modernization refers to periodic programmes to introduce new technologies, or design concepts, in order to re-orient an irrigation system to be able to achieve entirely new objectives, or to achieve the same objectives more efficiently. In practice, improvement programmes often combine elements of "rehabilitation" and "modernization," making the distinction mainly a conceptual one.

¹ This paper does not get into too much detail regarding issues such as institutional arrangements and development, etc., which will be dealt with separately under the subsequent Policy Papers, Nos. 4 - 10, and the connected Staff Working Papers. Some of these subjects are mentioned only for completeness of coverage.

Chapter 2

OVERVIEW OF PAST EXPERIENCES

2.1. Introduction

THIS CHAPTER PRESENTS an overview of past experiences with respect to irrigation system O&M and system improvement in Sri Lanka, to identify the basic problems and issues and to derive lessons for identifying the future direction that the irrigation sector in Sri Lanka should take in terms of O&M and system improvement for better performance and sustainability.

Operation and Maintenance (O&M) and Rehabilitation and Modernization (R&M) were considered as two separate processes in the past and have been implemented entirely differently. Accordingly, the two processes were considered as having separate programmes, approaches and budgets. A review of past experiences will, therefore, have to recognize these differences.

2.2. Past Experiences

EVER SINCE IRRIGATION projects were initially created in this country, there have been various programmes and strategies for their O&M. The different interventions have had their own merits and demerits and their impacts have also been different. These approaches can be divided into five main phases which are briefly presented below.

The first phase was the ancient times when some of the larger irrigation schemes were administered by the king whilst the smaller schemes were the responsibility of the beneficiaries themselves. In respect of the larger schemes, the peasants were obliged to provide free labour for a certain number of days per year, especially in respect of construction activities.

The second phase was the period of foreign occupation where the responsibility of operating and maintaining the tertiary system of the larger schemes was transferred to the beneficiaries themselves. Among the institutional arrangements to accomplish them was the establishment of the *vel vidane* (Irrigation Headman) position. The government also expected the beneficiaries to contribute substantially toward the construction, repair and improvement of irrigation works.

The third phase, in which the government began rehabilitating and restoring abandoned irrigation works, began during British rule in the 19th century and continued into the 20th. These programmes were aimed at both major and minor schemes.

The fourth phase also began during the 19th century, and continued until recently. In this phase, the government began imposing an increased degree of control over O&M by collecting irrigation fees from the farmers. After the end of the colonial administration, this scheme proved to be unsatisfactory and the government was compelled to invest its own resources for the O&M of schemes. Most of the new irrigation projects were funded by donors who became increasingly concerned about the proper O&M of these schemes. Contrary to the welfare approach of the government in subsidizing O&M work, the donors imposed conditions on the government to extract fees from the farmers for O&M work. There have been various fee collection programmes, all of which have proven to be totally unsatisfactory. This phase involved both major as well as minor schemes.

The fifth phase has just commenced, in which the government is planning to turn over systems to farmers' organizations for management, i.e., O&M. It is still at an experimental stage covering selected schemes where farmers' organizations (FOs) have been established.

A fundamental reason for the failure to induce farmers to pay O&M would have been the non-fulfilment of the farmers' expectation that the O&M and performance of their systems would be improved as a result of their fee-payments. The high rates of fee-collection in the first year reflected the farmers' expectations. For instance, in the Dewahuwa system — a difficult system to manage because of inadequate water availability and serious head-tail problems — the fee-payment rates were higher for the farmers who suffered from tail-end problems than for the head-end farmers. There is little chance for the fee-collection scheme to succeed, without building confidence among farmers that the scheme would lead to future improvements in the system performance.

The government made serious efforts to implement this fee-collection scheme. This can be seen from the efforts made to enforce the scheme by prosecuting the defaulters in legal actions. More than 7,000 defaulting farmers were brought to courts, but the government's efforts were severely constrained as the number of pending cases increased and accumulated. This suggests that had there been stronger legal support, the fee-collection scheme would have been implemented better. However, since the basic problem lies in the O&M management process, a mere implementation of fee-collection schemes without appreciable changes in the attitude of the irrigation bureaucracy and farmers toward O&M would not lead to improved O&M and system performance either in the short or in the long run.

Looking at the past experiences in this country, two distinct patterns can be identified. First, the minor tanks have continued to be operated and maintained by the local

communities irrespective of the phases referred to above. Even when natural calamities have destroyed the systems, farmers have attempted to bring them back into operation using their own labour. They have resorted to help from the government only when they by themselves found it impossible to succeed. Second, in the operation of major systems, government involvement is important and farmers are not in a position to undertake O&M all by themselves. Recent pilot water management projects have clearly demonstrated that the tertiary systems of larger schemes can be operated and maintained by the users if they are organized.

The irrigation sector in Sri Lanka has clearly moved from a construction to a management phase in which O&M and R&M are increasingly important activities in the management of irrigation systems created by massive investments during the past several decades. There is very little scope for further new construction and the management of the existing projects has become a major concern. It has been widely recognized that the newly created irrigation systems perform far less satisfactorily than expected, and that even such an unsatisfactory level of performance deteriorates further over time due to inadequate O&M of these systems after construction, so that rehabilitation becomes necessary much earlier than anticipated.

Along with the need for rehabilitation, there has arisen the need to modernize the irrigation systems — to take advantage of technological advancements to make these systems more efficient with respect to the relative scarcity of water, land and managerial resources and also to respond to the need for supporting ever-increasing numbers of rural communities dependent upon irrigated agriculture.

It can be argued that if O&M are done properly, the need for future rehabilitation may be at least postponed if not eliminated. Further work is needed to establish the O&M investment levels which would minimize the need for future rehabilitation, and optimize the most cost-effective level of maintenance.

2.3. Main Lessons

THE MAIN LESSONS that can be learnt from past experiences are that:

- i. Smaller schemes should be managed by the farmers themselves; government intervention should be limited to assisting with repair of these schemes when subject to a calamity.
- ii. For successful O&M and R&M, the larger schemes appear to be better managed jointly by the users and the agency staff, than when they are managed by the agencies alone.
- iii. In both types of schemes, institution building through the promotion of farmer participation is a pre-requisite for successful O&M and R&M.

- iv. Strategies adopted by different countries, particularly Asian countries, converge on the broad fundamental principle that financial autonomy of the irrigation management agency accountable to beneficiaries coupled with a decentralized system of management is a key to successful O&M.
- v. In the context of financial constraints faced by the government and the need for achieving high performance of the existing irrigation infrastructure, sharing of costs of O&M and R&M between the government and the beneficiaries is imperative.
- vi. The success of any fee-collection system depends on the presence of strong farmers' organizations and on their confidence that they would be able to utilize and control the funds thus collected for systems improvement.
- vii. Well-laid-out legal powers and procedures to enforce and implement irrigation fee collection by farmers' organizations are non-existent. Even with the present legal powers, the collection of irrigation fee directly by the government has proven to be a failure.
- viii. The physical rehabilitation of irrigation systems must integrate institutional and environmental considerations to achieve the desired level of performance and sustainability.
- ix. Physical rehabilitation should be based on a level of technology that is compatible with the capacity of the beneficiaries to use and adopt such technology.
- x. Given the existence of a large number of irrigation systems in the country which need urgent rehabilitation, capital intensive rehabilitation of a few selected schemes will not result in achieving the national goals for irrigated agriculture. Besides, the replicability of such capital intensive programmes elsewhere is both questionable and prohibitive.
- xi. Clear criteria are required for decisions on the level of investment in rehabilitation of systems, but in general, a pragmatic learning-process approach is required, that focusses investments on essential improvements that would have an impact on performance and sustainability. This suggests emphasizing low-cost improvements to a large number of schemes.

Chapter 3

FUTURE STRATEGIES FOR OPERATION AND MAINTENANCE AND REHABILITATION AND MODERNIZATION

3.1. Basic Concepts

THE PRODUCTIVITY AND profitability of crop production depends on supply, use and integration of many inputs and support services including marketing. Adequate, reliable and equitable supply and distribution of irrigation water, and the efficient use of this resource are also essential pre-requisites. As the physical irrigation system is the basic means for acquiring, storing, allocating, conveying, regulating and distributing irrigation water and removing drainage excess, it must be continuously maintained in good working condition.

Many factors affect the sustainability and performance of an irrigation system. These include design deficiencies, construction defects, lack of funds for operation and maintenance, mismanagement of funds, sub-optimal maintenance, or improper operation, and the lack of farmer participation in the various stages from investigations to operation and maintenance. As human beings are involved in these processes such imperfections are inevitable, though they can be minimized.

The success of O&M and R&M approaches depends on the extent to which the beneficiaries, in collaboration with the planners, are involved in planning, implementing and evaluating irrigation works. Experience suggests that a pre-requisite for sustainable participatory management of irrigation systems is the existence of strong farmers' organizations.

The collective effect of these factors coupled with occasional damage to system components by catastrophic events and by wilful damage by the users further accumulate to such a degree that some extra effort will be required to restore the design capacity and capability of the system at some future date, unless problems are cared for as and when they occur.

Also it would be necessary, over the life cycle of an irrigation scheme, to modify the original designs and canal layouts to accommodate new social needs and policy changes or to resolve conflicts over irrigation water distribution; and use new technologies and

techniques to improve operation, enhance production and profits, or to improve the efficiency of resource use. The former effort is called "rehabilitation" and the latter "modernization." Although this separation is conceptually possible, these interventions are usually combined in different proportions in real R&M programmes.

The processes of O&M and R&M usually go hand-in-hand in reality. The latter influences the short-term performance of a system, while the former affects both the short-term and long-term performances. These two processes are complementary to each other and are not mutually exclusive. If operation is inefficient, maintenance needs become more acute and if maintenance is sub-optimal, operation becomes difficult and inefficient, forming a vicious circle. If both are inefficient, rehabilitation is required sooner. Similarly, in the long run, if the rehabilitation is not done or modernization of the system is not effected as and when required, operation and maintenance become more inefficient and the system will fail to meet the changing social, economic, technical and policy objectives, impeding maximizing of productivity and profitability of irrigated crop production on a sustainable basis. Therefore, O&M and R&M should be viewed as twin sub-processes in a larger process of improving performance and sustainability of an irrigation project.

3.2. Guiding Principles

- i. A BASIC PRINCIPLE that guides effective O&M as well as R&M strategies is that the system should be capable of being operated to achieve efficient distribution and use of irrigation water as well as to remove drainage excess for maximizing crop production and profitability. This requires effective and continuous O&M in the short run, and in the long run will require well-planned cost-effective R&M as well. Thus, O&M, R&M and system performance are closely related and inseparable from one another.
- ii. The sustainability of an irrigation system, particularly after rehabilitation, depends on effective operation and maintenance. In jointly managed systems this task will be shared by the users and the government, while in self-managed systems the farmers will bear the responsibility with minimal government involvement. Hence, R&M programmes must include strategies to create, establish or enhance the capacity of the beneficiaries to undertake this responsibility in the future.
- iii. The continuous upkeep of irrigation systems and periodic rehabilitation and modernization need substantial commitments of resources. The government on its own cannot bear the full expense in the years ahead. On the other hand, government control of resources and management of irrigation systems, with little beneficiary participation in decision making and implementation, has proved to be unsuccessful in achieving the ultimate objectives of effective irrigated agriculture in the past. The strategies for O&M and R&M should be developed to enhance collective beneficiary participation with a view to establishing among farmers a strong sense of ownership of the systems, upon which their livelihoods depend.

- iv. This leads to the principle that a part of the resource commitments and management functions required for O&M and R&M of irrigation systems should be shared by the government and users of irrigation systems in the future. As the capabilities of farmers' organizations and farmers' incomes improve, they will take over a substantial share of the resource mobilization and management functions of irrigation systems. The strategies for O&M as well as R&M set for the immediate future should, therefore, be designed to achieve this long-term vision.
- v. The farmers will not mobilize their resources, participate in decision making, planning, implementation or sharing costs for O&M and R&M, unless some tangible benefits are derived from their efforts. The benefits may take many forms; improved performance of the system; improved accountability of the irrigation management agencies to the farmers' organizations, particularly in jointly managed systems; and enhanced incomes and profits. The strategies should consider this principle too.
- vi. One basic principle is that system performance and system O&M are closely related to each other. If one is lacking, the other cannot be forthcoming either. Any strategy for effective O&M cannot be only for O&M in isolation. The causal relation from O&M to system performance is apparent. What may not be so clear is the causal relation in the opposite direction, which stems from another basic principle; viz. that farmers' involvement in a collective manner in the O&M process is a pre-requisite to sustainable O&M, and this is assured only when the system performance is satisfactory to the farmers or when there is a strong possibility of improving it. Otherwise, an irrigation system cannot escape from the vicious circle of poor O&M and poor performance.

These principles drawn from our past experiences with O&M provide guidance in designing strategies for sustainable O&M of irrigation systems.

3.3. Strategies for Effective O&M

3.3.1. Short-Term and Long-Term Strategies

THE 'VISION' PAPER of IMPSA states that "by the year 2000, farmers will be responsible for 100 percent of the O&M costs of the portions of irrigation systems under their management. As they become more prosperous, in the long term they may begin to pay for some of the services provided by the state agencies, including O&M of main systems controlled by agencies, and technical management services." The short-term (until the year 2000) target, therefore, is to establish a joint-management system in which the farmer-beneficiaries take full responsibility of O&M at the secondary system and below, while O&M of the main system are managed jointly by the agency and the farmers with shared decision making and with the main system O&M costs being made available by the government in the interim. The long-term target is for the farmers to start sharing part of the O&M costs of main system and technical services associated with system management.

This long-term target does not exclude the possibility of cost-sharing for the main system O&M or the farmer-beneficiaries taking over the O&M costs of the main system by agreeing to take over for self-management a scheme which has been earlier under joint-management.

The paragraphs that follow spell out strategies that would make it possible to attain the short-term target, while not losing sight of attaining the long-term objective.

3.3.2. *Sharing O&M Responsibility and Costs*

- i.* FOR THE SYSTEMS under joint-management, the full responsibility of O&M at the distributary-channel (DC) and field-channel (FC) levels will be turned over to the farmers' organizations as described in PWP No.2.
- ii.* The full O&M responsibility will mean that the Distributary Channel Organizations (DCOs) — hence the farmers — carry out all O&M activities at the DC and below, that is, all the operations related to DC and FC turnout gates, water rotation, etc., as well as the maintenance of all the physical structures such as channels, channel reservations, irrigation roads associated with the channels, turnout gates, pipes, etc. These will also include the mobilization of resources needed for O&M.
- iii.* The farmers will be obliged not only to contribute their labour but to bear material costs needed for O&M. The DCOs will be encouraged to raise a revolving fund, the interest on which can be used for meeting such cash needs. As a transitional arrangement, during the initial period of turnover, the government may also allocate public funds for this purpose either annually — i.e., in increments, or once in a lump sum — sufficient to build up the capital fund.
- iv.* In major irrigation systems the taking of increasing O&M responsibility by farmers, will obviate the need for them to pay irrigation levies to the government. The FOs should be allowed to levy fees. The proposed amendments to the Irrigation Ordinance will provide for the Government Agent to grant such exemptions.
- v.* The irrigation management agency will monitor the farmers' O&M at the DC and FC levels, and extend technical support to DCOs as and when needed. As the farmers share the decision making in the O&M process of the main system, the agency shares the responsibility for O&M at the DC level through monitoring and technical support. The agency will also be responsible for setting out technical O&M standards for turned over DCs, in close consultation with the DCOs.

- vi. For the DCs for which DCOs are not yet formed, or for the DCOs that are not willing to take over O&M responsibility, the farmers in the DCs will pay the irrigation levy to be specified for the DC level and below. To the extent possible, this levy should be determined to reflect the real O&M needs of the specific DCs and the specific systems, and the actual costs incurred by the government. For that purpose, studies have to be done to set standards for the O&M needs according to certain criteria such as canal and physical structure densities. Whatever the levy rate will be, it must be adjusted frequently to reflect the increases in costs involved.
- vii. As the general principle is for the farmers' organizations to take the responsibility for O&M at the secondary and tertiary levels, as many incentives as possible should be given to DCOs that take over the O&M responsibility as opposed to those that do not. On the other hand, there should be strong and prompt legal support to enforce the payment of the levy at a stipulated rate for the farmers who are required to pay such levy.
- viii. The decision making regarding O&M not only at the main-system level but also at the secondary-system level and below, from planning, seasonal as well as long run, to implementation, will be done jointly by the agency and the farmers. It will be necessary for FO representatives and agency officials to work out jointly, the detailed responsibilities of each party. The duties and functions of the field-level staff of line agencies have to be re-defined to make them more responsible and accountable to FOs and the farmers.
- ix. As the success of joint-management depends heavily on O&M performance at the main-system level, the government will make every effort to ensure its high level of performance, including the allocation of sufficient O&M funds. The firm commitment of the government in this regard will be a key to the success of the new strategy.
- x. As the willingness of the farmers to take over the responsibility for O&M at DC and FC and actual performance after the turnover will depend critically on the state of the sub-system at the time of turnover, the government will assist the FOs to improve the state of the physical structures as a part of the turnover process. For this purpose, the government may need to set aside special capital funds for a certain extended transition period. This has to be estimated on a project-by-project basis. Donor funds could be used to cover much of these costs.
- xi. For the systems that come under self-management, the responsibility for O&M of the entire system will rest with the farmer beneficiaries, including the mobilization of resources for O&M. The government will further improve the support services rendered to these farmer-managed systems in order to improve their performance and sustainability.

- xii. Any other beneficiaries besides the farmers, who are benefitting from the irrigation scheme, should also contribute to O&M of the scheme.

3.3.3. Changing Investment Priorities

- i. O&M SHOULD BE given the highest priority of all types of investments and expenditures in the irrigation sector. The present fund allocation practice whereby O&M funds are determined as a residual after taking out other investment/expenditure needs will be done away with, and the funds necessary for O&M should be set aside first, in the allocation of funds available to the sector.
- ii. The government should make every effort to persuade the international donor agencies to change their funding policies, as far as the irrigation sector is concerned, from financing capital construction projects to financing activities which aim at water management improvement and institutional strengthening, to promote joint-management and self-management.
- iii. In the case of ongoing new construction and rehabilitation/modernization projects now in the pipe line, careful consideration should be given from the project-design stage through implementation stage, to strengthening O&M and joint-management institutions during and after the capital construction period. These projects should be viewed as instruments for implementing the new policy of self- and joint-management, rather than as mere capital construction/physical structure improvement projects, in isolation.

3.3.4. Changing Agency Structure²

REORGANIZATION OF THE irrigation agencies will be necessary in such a way that O&M are given the highest priority, and are performed more effectively. For example, a number of branches within the Irrigation Department are involved closely in the performance of O&M activities. Some functions of these are allocating funds, identifying systems for rehabilitation, and planning the implementation of rehabilitation work, training staff and users. In order to accomplish these tasks, a multi-disciplinary team must be in place and the division be headed by an Additional Director who will be able to devote his/her full time to O&M functions. The investigation, design, and construction activities will be grouped together separately.

² Detailed strategies for required institutional changes in respect of government agencies will be spelt out in Policy Working Paper No. 4 and its associated Staff Working Papers.

3.3.5. *Monitoring and Evaluation of O&M*

- i.** AN EFFECTIVE SYSTEM for monitoring and evaluation (M&E) of the O&M process including both the main and secondary/tertiary sub-systems will be developed and institutionalized. Norms, standards, and criteria by which the volume and quality of various O&M works can be monitored and evaluated effectively and promptly have to be developed.
- ii.** The process and the results of M&E will be shared by the agency and FOs on a seasonal basis. FOs will actively participate in the data collection, monitoring and data analysis. The Project Management Committee meetings or post-season workshops can be the fora for evaluating information collected by farmers. This will form the basis for future management information systems of line agencies.
- iii.** The process and the results of M&E have to be linked with the rehabilitation of the system in the long run. The information obtained from evaluation of the state of O&M of a system is used for preparing the data on the rehabilitation requirements of the system, which will in turn be used for selecting systems for rehabilitation.

3.3.6. *Rationalization of O&M Fund Management*

- i.** AN EFFECTIVE AND efficient system of handling, accounting, and auditing the government O&M funds will be developed, so that the information obtained from the O&M fund management process can be effectively used for M&E purposes.
- ii.** The development of an effective O&M fund management process is necessary to make the budgeting, fund acquisition and spending process transparent enough not only for the auditing office but for FOs and the farmers. As FOs participate in planning and implementation of the O&M of the main system, they do so in monitoring the use of the allocated O&M funds.

3.3.7. *Uniform O&M Strategy for the Country*

THE NEW STRATEGY will be adopted uniformly throughout the country, while ensuring as much flexibility as possible for individual irrigation systems, ranges and hydrological regions, and Provincial Councils.

3.4. *Future R&M Strategies*

IMPSA POLICY PAPER 1 states that "the 1990s will be a period of completing the round of rehabilitation and modernization projects initiated in the mid-1970s. But during the 1990s, based on the lessons learned in the 1980s, these projects will be implemented in such a way

as to be cost-effective, responsive to the real needs of the farmers (i.e., demand-driven), contributing to developing farmers' commitment and sense of ownership toward their systems, and as a vehicle for building and strengthening farmers' organizations which would take over increasing management responsibility."

This policy objective is sought to be achieved through an implementation process which could be distinguished as having two stages. During the first stage (i.e., in the next four to five years) conditions will be created to build and strengthen FOs and re-orient irrigation agencies through the process of the turnover of irrigation management responsibilities to FOs, through the new management systems for irrigation projects to be established and through their involvement in the implementation of ongoing R&M projects. These ongoing projects will also be the testing ground for undertaking research and development on low-cost and appropriate technologies as well as for efforts at sharing R&M costs between the government and the FOs.

On large systems in particular, the rehabilitation of the main system should be implemented prior to the rehabilitation of the secondary and tertiary, /i.e., DC and FC/levels, in consultation with the FOs. While the main system work is underway, the irrigation agency will work with farmers to strengthen FOs and prepare them for participation in planning, designing, and implementing the rehabilitation.

The second stage, to be underway by the late 1990s, will be marked by the existence of well-organized and strong FOs that will then be in a position to initiate requests to the government for further improvements in their systems on a cost-sharing basis. The R&M programmes in the future will, therefore, take into consideration these demands. This will lead to systematically drawn up national and provincial master plans with clear-cut investment priorities and institutional arrangements for implementation.

The following detailed strategies are proposed.

3.4.1. *Scale of Rehabilitation*

THE COMPLETION OF the round of rehabilitation begun in the 1970s will be on the basis of a cost-effective investment strategy, suitably phased-out to match the availability of limited funds in the future and providing for the use of "appropriate" technologies for improving irrigation systems. These programmes will be essentially "pragmatic," and the irrigation systems will not necessarily be restored to their original design condition. "Pragmatic rehabilitation," as developed under the Gal Oya project and further refined under the ISM project, involves a field-based diagnosis of the essential works required to ensure the safety and manageability of the system, so that it can perform at a level adequate to achieve current objectives.

The main advantage of this strategy will be the possibility of taking up a larger number of projects for rehabilitation and modernization simultaneously, due to the lower level of investment required. It will also overcome constraints of large-scale capital investments in irrigation rehabilitation and modernization. Adopting this strategy may require some adjustment in current and recently planned projects.

3.4.2. *R&M and Institutional Strengthening*

ALL REHABILITATION PROGRAMMES will be coupled to parallel programmes for promoting the effective participation of the farmers. Well-organized and strong FOs will have a significant role to play in the decision making and implementation processes of R&M projects through their involvement in the new project management system (see PWP NO.2).

The technical processes of feasibility studies, investigations, planning, design and construction for R&M will be integrated with the institutional processes of organizing and mobilizing farmers by developing capabilities of the irrigation management agencies and farmers, and by action research. This will be the fundamental approach in all stages of future R&M projects.

It is expected that henceforth farmers will share a reasonable proportion of the total costs of R&M projects. The National Irrigation Rehabilitation Project (NIRP) offers a laboratory to test arrangements for operationalizing this principle. Factors such as the costs of required work, the likely returns to the farmers, and the farmers' ability to pay must be considered.

3.4.3. *Sharing of Costs*

ALL FUTURE PROGRAMMES for rehabilitation and modernization of irrigation systems will be initiated only on requests made by beneficiaries for assistance to improve their systems to increase agricultural production. The beneficiaries will be required to share the cost of the proposed improvements, by way of cash or labour or both. The government will select those projects for implementation that meet with criteria yet to be developed, of which institutional feasibility would be a vital one in addition to economic and technical feasibility. The government will meet its share of the cost of such R&M projects. Trade-offs between the need for improvement of a project as determined in terms of the criteria laid down and the extent of contribution the farmers are able to make, will be provided for.

Sharing R&M costs has the following benefits:

- i.* Willingness to share costs could be used as a criterion for prioritizing R&M.
- ii.* Guarantees FOs a right in decision making regarding the nature and extent of R&M.

- iii. Makes the process of R&M cost-effective.
- iv. Provides the farmers with a sense of ownership of the irrigation system.
- v. Enables the government to spread its limited financial resources over a large number of projects.

3.4.4. Government Role in R&M

THE NATIONAL AND provincial irrigation agencies will be responsible for assisting the FOs in implementing R&M of the inter-provincial and the provincial irrigation projects, respectively. The Mahaweli Authority of Sri Lanka (MASL) will continue to retain responsibility for the irrigation systems managed by it until such time the administration of the completed irrigation projects is transferred to the ID and the FOs. Because of the inter-dependence of the systems sharing a common catchment area, all Integrated Rural Development Project (IRDP) authorities, private sector organizations or NGOs will obtain prior clearance from relevant irrigation agencies before formulating R&M projects to be funded by them, particularly the restoration of abandoned irrigation tanks.

The government will provide or facilitate the provision of various support services required for implementing the new participatory approaches in R&M in the future. These will include:

- * training and education;
- * preparation of O&M and construction manuals for farmers;
- * developing and institutionalizing the strategies for participatory approaches in all phases of a rehabilitation project;
- * revising the relevant existing departmental procedures and regulations to facilitate beneficiary participation in R&M;
- * providing intensive technical assistance and guidance to farmers during construction stages;
- * developing research capabilities of the line agencies;
- * improving management information systems; and
- * developing data bases.

The government will encourage FOs to seek private sector funding in R&M, subject to the terms and conditions agreed upon by the beneficiaries and the government.

3.4.5. *Selecting and Prioritizing Projects*

THE NATIONAL AND provincial irrigation agencies will develop criteria for selecting and prioritizing R&M projects. In the long run, the existence of strong FOs willing to share the cost of physical rehabilitation will be considered a primary criterion for selecting and prioritizing schemes for R&M, besides technical and economic criteria.

The selection criteria for R&M projects will include consideration of a variety of factors, including technical requirements, economic returns, and equity (assisting poor farmers). A clear objective procedure for identifying potential projects, eliciting and processing applications from the FOs, and allocating resources will be developed.

3.4.6. *Macro Planning for R&M*

THE GOVERNMENT, THROUGH its agricultural and irrigation agencies, will identify potential areas for production of different crops country-wide as well as project-wise. All R&M projects, in the future, will be planned and designed to accommodate the irrigation needs of these production areas.

National irrigation agencies will prepare a data base and a national plan for rehabilitation and modernization of the existing irrigation infrastructure, based on these production areas. This will include trans-basin diversion canals and other feeder canals to major tanks, drainage control, flood protection, salt water exclusion projects, land consolidation and development projects as well as inter-provincial irrigation projects. The plan will specify, among other matters, the short-term and long-term investments required from the national budget for rehabilitating the existing irrigation systems. It will also prioritize and classify irrigation systems on the basis of those needing:

- * Little or no rehabilitation;
- * Substantial rehabilitation; or
- * Modernization to achieve new objectives.

The provincial irrigation agencies will, likewise, prepare separate plans for the rehabilitation and modernization of irrigation systems coming under their purview. In preparing these plans, special consideration will be given to the demands of the beneficiaries. As a basis for planning, a comprehensive data base on water resources, irrigation systems and their status, etc., will be required at both national and provincial levels.

3.4.7. *Research and Development*

THE GOVERNMENT WILL set up a Joint Research Committee comprising selected professionals from the ID, Department of Agriculture (DOA), MASL, Irrigation Management Division (IMD), Department of Agrarian Services (DAS), Agrarian Research and Training Institute (AR&TI), IIMI, universities, the private sector, and

other agencies involved in irrigation management research to address the key issues relating to Research and Development in the future.

The proposed committee will provide research policy guidelines, evaluate research programmes, prioritize and coordinate all research. The relevant agencies will manage the research programmes as recommended by the committee. The government should provide financial support for enhancing capacities of the key agencies to manage and undertake the above research.

Ongoing R&M projects will be a testing ground to improve future projects. The design and operational assumptions used for feasibility and appraisal studies as well as operations and new technologies must be tested with farmer participation. This process itself can also be used to promote FOs and for building agency capacities. The funds required for pilot testing and experimenting with the farmers should be provided by the R&M project and borne by the government.

3.4.8. *New Technologies*

AS FARMERS BEGIN to share O&M and R&M responsibilities progressively, increasing demands will be made by them for substantial improvements in the quality of operation of the main systems. Also, any future strategies for ensuring economical use of water through fixing a value on quantities used or for the bulk allocation of water, will involve the introduction of cost-effective technologies to facilitate volumetric measurement of water. This is also considered an important element in good irrigation management.

Building on the experiences gained in many existing irrigation systems, irrigation agencies will improve their capacities to develop and handle tools such as computer-based water scheduling and distribution models as priority needs. Research and development of cost-effective technologies and techniques for volumetric measurement of water will be a priority in the future. Further agricultural modernization will also demand a satisfactory flexibility in operation for irrigating a range of field crops. It will, therefore, be necessary to develop the appropriate technologies to meet this demand.

3.4.9. *Trade-offs between O&M and Rehabilitation*

IN ORDER TO ensure greater cost-effectiveness in achieving high performance and sustainability of irrigation systems, it will be necessary to identify the trade-offs between different investment combinations for O&M and rehabilitation. The existing knowledge in this respect is not adequate. The ongoing as well as future rehabilitation programmes will be used to explore this theme, to experiment with different options, and to evolve the desirable levels of O&M and rehabilitation.

This subject will be treated in more detail in Policy Working Paper No.9 entitled "Future Irrigation Investment Policies."

Chapter 4

SUMMARY OF RECOMMENDATIONS

4.1. Strategies for O&M

4.1.1. Turnover

RESPONSIBILITY FOR O&M of the entire irrigation system in self-managed systems, and of the secondary and tertiary canals in jointly managed systems, should be turned over to farmers' organizations.

4.1.2. Irrigation Levies

- i. FARMERS SHOULD BE exempted from paying irrigation service levy to the government in return for taking over systems and sub-systems for self-management.
- ii. Until the systems and sub-systems are taken over for self-management by the FOs, the farmers in major irrigation systems should pay a stipulated irrigation levy. The government should establish strong and prompt legal support to enforce levy payment.
- iii. Any other beneficiaries besides the farmers who benefit from the irrigation schemes, should also contribute to O&M of the schemes.

4.1.3. Incentives

INCENTIVES SHOULD BE given to FOs that take over O&M as compared to those that do not.

4.1.4. Funds for Main System O&M

- i. THE GOVERNMENT SHOULD make every effort to ensure a high level of main system performance. This will need allocation of sufficient funds annually. However, decision making regarding O&M of the main system should be a joint-effort between the FOs and the irrigation agency.
- ii. O&M should be given the highest priority in the matter of allocation of funds in the irrigation sector. The government should persuade international donor agencies to support this policy.

4.1.5. Agency Re-orientation

THE IRRIGATION AGENCIES should be reorganized with appropriate structural and institutional modifications to ensure strong commitment and capacity to effectively implement the policy of participatory management.

4.1.6. Monitoring and Evaluation

THE O&M OF main system as well as secondary and tertiary sub-systems should be monitored. The FOs should actively take part in data collection, monitoring and, perhaps, data analysis and evaluation. The results of M&E should be linked to planning of rehabilitation projects.

4.1.7. Fund Management

THE GOVERNMENT SHOULD develop appropriate O&M fund management systems in which the budgeting, fund acquisition and spending process is transparent enough not only to the audit officers but to the FOs and the farmers as well.

4.1.8. Uniform O&M Policy

THE POLICIES FOR O&M should be adopted uniformly throughout the country.

4.2. Strategies For R&M

4.2.1. Ongoing Rehabilitation Projects

- i. ONGOING REHABILITATION PROGRAMMES should be implemented in such a manner that they are responsive to the real needs of farmers, are cost-effective, and act as a vehicle for building and strengthening the FOs which would take over increasing management responsibilities.
- ii. R&M programmes should be cost-effective and essentially "pragmatic." The farmers should actively participate in the activities of the various phases of these programmes.

4.2.2. Institutional Strengthening

THE TECHNICAL PROCESSES of R&M should be integrated with institutional processes for organizing and mobilizing farmers and agency officials for self- and joint-management of irrigation systems.

4.2.3. Cost Sharing

FARMERS SHOULD SHARE the cost of R&M programmes with the government. Ongoing R&M programmes should be used as grounds to experiment with different strategies for cost sharing.

4.2.4. *Support Services*

ADEQUATE SUPPORT SERVICES required for implementing the new participatory approaches in R&M should be provided by the government.

4.2.5. *Selection Criteria*

THE NATIONAL AND provincial irrigation agencies should develop criteria for selecting and prioritizing projects for R&M. These will include the existence of strong FOs, willingness of farmers to share R&M costs with the government, and equity. Technical and economic considerations will also apply.

4.2.6. *Macro Planning*

A DATA BASE and associated plans for planning and implementing R&M programmes should be developed by national and provincial irrigation agencies.

4.2.7. *New Technologies*

RESEARCH AND DEVELOPMENT on cost-effective new technologies and techniques should be a priority in the future. A joint-research committee represented by the irrigation and agricultural agencies, universities, research institutes and private sector establishments should provide research policy guidelines, and coordinate and monitor research programmes related to irrigation management.