IRRIGATION MANAGEMENT TRANSFER: MONITORING AND EVALUATION CONCEPTS AND APPROACHES

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ABSTRACT

Irrigation Management Transfer (IMT) from Government to users has brought many benefits including improved management, lower overall management costs and empowerment of local people that has multiplier effects in community – building and quality of life.

Experience gained and learned lessons indicate clearly that institutional reforms towards participatory management of irrigation systems require a learning process that should involve representatives of key stakeholders.

Different stakeholders will have different and potentially competing interests in the process, outcomes and possible impacts of the reform and, accordingly, IMT creates a new form of organization where much uncertainty is involved. Monitoring and evaluation (M&E) can play an important role in reducing the level of uncertainty about IMT and in bringing to light objectives and timely information about how IMT is being implemented, what outcomes are emerging and, eventually, what impacts are realized.

Evaluation findings can enable policy-makers to assess whether the reform was appropriate or not and to give realistic answer to the question: "Are we doing the right things or the wrong ones?" M&E together enable us to judge the IMT process, though it implies designing an M&E system that is complete, concise and valid. This is what will be highlighted and discussed in this paper.

INTRODUCTION

Irrigation development during the 20th century greatly expanded the world-irrigated lands from 48 million hectares to roughly 255 million hectares (17% of the world crop lands) that represent a phenomenal growth for increasing the potential to feed the world. The irrigated land produces one third of the world's food. Between 1961 and 1990, the area under irrigation increased by almost 100 million hectares. The annual growth rate of irrigated area exceeded 2% during the 1960's and 1970's. Today, the growth rate has slowed down to a moderate value of 0.8%. The medium variant estimates of world

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population growth, as indicated by the UN's world population (the 1992 version) indicate that from 1995 to 2020, the population will increase to 8.1 billion. According to FAO (1997), the share of world food production that comes from irrigated agriculture must increase from the present 34 to 45% in the year 2020. Achieving such a goal is fundamentally a matter of the way we are using and managing water in the irrigated sector as it globally receives more than 70% of the available water resources, but, unfortunately, with a very poor on-farm water use efficiency not exceeding 50%.

Indeed, by the 1970's, there was rapidly growing awareness that much more emphasis needed to be placed on irrigation management, which is an on-going learning process in many countries. Experiments in developing countries on converting government-managed irrigation systems to farmers' management have mostly taken place during the past two decades, and continue at the present time but, usually, much more time will be required before the fledgling farmer organizations are strongly functional and sustainable.

We believe that a set of vital elements are needed to manage irrigation systems effectively and sustainably, and some of them are identified in the following:

- clear and recognized management and responsibilities;
- irrigation infrastructure compatible with the water rights and local management capacities;
- adequate financial and human resources management;
- clear and sustainable water rights, and
- supportive accountability and incentives for the managing entities.

A realistic characterization of the situation where the State is the central actor of water management in the irrigation sector, confirms that those vital elements are partially or completely absent. These are the basic elements that led to a revolutionary approach in water management, from the State being a central actor towards a greater participation of other actors, including local governments, non-governmental organizations and, above all, the beneficiaries, the water users, i.e. the farmers.

The necessity for doubling water productivity for irrigated agriculture over the coming decades is strongly dependent upon having both a clearly defined water rights system in each irrigated region, as well as sustainable farmers' organizations for vastly improving irrigation water management.

Politically and technically, it has now been recognized that unless farmers are involved in operation, management and maintenance of irrigation system, the objective of increased utilization and production from irrigation commands cannot be realized.

Considerable efforts have been made in many countries of the world to implement participatory irrigation management (PIM) program in the last two decades. This is a trend of worldwide dimensions: as many as 25 countries in the world are actively engaged in irrigation management transfer programs (IMT) to farmers and every few months new countries are added to the list. However, in spite of such wide expansion in the implemented management transfer programs, little is known about the effectiveness

of those programs and their impacts on the water use and its management in the irrigation sector.

Equally and for most countries, it is rare to find a complete analysis of management transfer impacts in terms of legal organizational factors and operational procedures in view of the perspectives of water users, the irrigation association, the irrigation agency and the national or state government. Indeed, evaluation of the results achieved by the newly established water user associations (WUA) is often lacking and, therefore, the possibility of improving the strategy selected is frequently missed. Therefore, the present paper will deal with monitoring and evaluation of irrigation management transfer in a more effective way.

IRRIGATION MANAGEMENT TRANSFER: AN OVERVIEW

Centralized irrigation administration has become a financial burden for many countries.

In addition, so many irrigation systems are deteriorating which penalizes agricultural productivity. The prognosis is that these countries will be unable to meet the food demands of the growing population.

Since the early 1970's, awareness about the necessity of recognizing the farmer beneficiary a greater role in irrigation systems has increased. Both, the Asian Development Bank (1973) and the International Bank for Reconstruction and Development (1985) stressed the importance of local grassroot organizations. The U.S. Agency for International Development (1983), in an assessment of irrigation projects in developing countries, concluded that the major emphasis was on construction, while the social, institutional and management aspects were largely neglected. In addition, the U.S. General Accounting Office (1983) urged the establishment of Water Users' Associations that would perform routine maintenance on secondary canals, along with communicating the needs of farmers to project officials. By the 1990's, considerable emphasis was being given by international donors and leading agencies to establishing farmers' organization on various irrigation projects in a number of countries (Ostrom, 1992) with the adoption and the implementation of irrigation management transfer programs (IMT).

In recent decades, PIM programs and IMT policies have become a worldwide phenomenon. At the national levels, when looking at the implementation of PIM programs and the adoption of IMT policies, we find three typical situations:

- countries where PIM policies have a long tradition and where the management by farmers is considered the normal way of managing an irrigation system. Example of such countries are the industrial countries such as the U.S.A., Australia, New Zeeland and Northern European countries (Spain, France, Italy);
- countries where substantial efforts have been made in recent years to implement PIM policy and IMT strategies whereby the majority of the irrigation systems have been transferred to farmers' associations, for example: this is the case of Turkey, Mexico, Albania and the State of Andhra Pradesh in India;
- countries where governments seem to have some reservations about the rapid implementation of PIM policy and prefer to assess the feasibility of implementing

such policies in selected areas. Such countries are predominant in many third-world countries in Latin America, Asia, Africa, and MENA regions.

A comprehensive study funded by the German Government (Vermillion, 1996), reports that irrigation management transfer will be acceptable to farmers' organizations and result in sustainable local management only where the following arrangements are in place:

- the transfer is cost-beneficial to the majority of farmers (at least in the long term);
- social divisions are not serious enough to disrupt communications and decision-making between farmers;
- clear and sustainable water rights are vested in the managing entity, i.e. the farmers' organization;
- the policy transfer clearly designates responsibility, authority, supportive accountability, and incentive mechanisms at the operational level, including a clear designation of responsibility for long-term maintenance and rehabilitation;
- irrigation system infrastructure is appropriate for local management capabilities;
- adequate human, financial and information resources are available to support local management.

WHAT IS IMT?

We define irrigation management transfer (IMT) as the turning over of authority and responsibility to manage irrigation systems from government agencies to water users associations (WUA's). This involves the following two key-roles:

- the authority to define what the irrigation services will be;
- the authority to arrange for provision of those services.

The key services are generally water delivery and maintenance of irrigation infrastructure, although there may other services desired after transfer, such as technical consultation, design and construction, information, extension, credit, marketing, etc. After IMT, water users should have the authority, through democratic means, to define what services should be provided, what their objectives and targets should be and what service performance standards are acceptable.

According to Kloezen and Samad (1995), there seems to be a consensus that irrigation management transfer program should involve at least three contingent strategies: improvement of support services delivery; empowerment of farmers and farmers organizations; and irrigation system long-term financial viability.

IMT AND ITS WIDESPREAD PROGRAMS: THE DRIVING FORCES

Several reasons are rapidly pushing to hand over the IMT from the government authorities to the beneficiaries: the farmers.

In a majority of countries, the primary reason for undertaking irrigation management transfer is to significantly reduce public expenditures for irrigation recurring costs.

Equally, the disappointing performance of irrigated agriculture is due to the following four major reasons (Geiger, 1995):

First, the under-utilization of irrigation facilities, the areas actually irrigated has usually fallen short of those projected;

Second, poor system management: most systems are constructed by the same agencies that are subsequently in charge of their operation; these agencies might be capable of construction, but they are not always skilled in responsive management;

Third, the gap between the bureaucracy and the beneficiaries is often too distant to enable efficient and responsive management;

Fourth, inadequate maintenance of infrastructure: generally, insufficient funds for maintenance as well as the provision of adequate funds usually do not result in proper maintenance.

Besides such reasons, there are other driving forces and motivations for irrigation management transfer, some of them being:

- the perception that public irrigation agencies lack the incentives and responsiveness to optimize management performance;
- the farmers' interest in effectively contributing in deciding on the cost-efficiency of irrigation and in preventing the deterioration of irrigation systems;
- the well-recognized management system that is more accountable to farmers will be more equitable and responsive provided that the cost service provisions be borne by the beneficiaries.

Indeed, the rapid expansion of irrigated areas in the world after the Second World War was not matched by a corresponding increase in funds available for managing irrigation systems. Financial pressures on governments, lack of sufficient funds allocated to irrigation management, widespread deterioration and poor performance of irrigation systems, failure to collect sufficient water charges from farmers, commercialization of agriculture, and the general trend of liberalization and privatization are all factors which have led to such wide adoption of IMT programs in many countries.

IMT: MAJOR ISSUES REQUIRING SPECIAL ATTENTION

In developing IMT policy and program, several issues will raise that may require analysis, experimentation and negotiation. Policy issues are generally about: *What the future will look like?* Program issues are generally about *: How to get from the present to the future?*

The following are the four most common and important IMT policy issues, (Vermillion and Sagardoy, 1999):

- What functions should be transferred, to what organizations?
- How will irrigation O&M, rehabilitation and modernization be financed after IMT?
- What policy and legal changes need to be made to support transfer?
- What changes should be made in public agency mandates as a result of transfer?

Regarding the IMT program, the previous authors outlined the following most common four issues:

- How should the local organization be related and prepared to take over management?
- What improvements in infrastructures and management need to be made?
- How should agency reforms be designed and carried out?
- How can an effective system of monitoring and evaluation be set up?

Monitoring and evaluation may provide feedback that leads to modifications in design of the program.

IMT PROGRAMS: LESSONS LEARNED

The most striking lesson from an analysis of transfer projects is the strong resistance by governmental irrigation agencies towards irrigation management transfer to organized farmers. In some cases, irrigation staff do not believe (or think they cannot afford to believe) that farmers are capable of managing an irrigation system, even though there may already be successful farmer-managed irrigation systems in the country. Indeed, irrigation management transfer, if properly executed, could benefit both the farmers and the government. However, it needs to be carried out in a carefully staged process, adequately addressing farmer's needs and aspirations. Furthermore, there is an urgent need for a thorough strategic orientation of government agencies from direct management organizations to support services and regulatory organizations. Equally, for irrigation management transfer to be sustainable, emphasis should not be only on the turnover process, but, there should be an economic basis that makes irrigated agriculture profitable to farmers. To ensure the management systems after turn-over, complementary policies have to be integrated with irrigation management transfer programs.

IMT is potentially sensitive and there may be opposition to it by influential groups such as irrigation agencies and politicians. Therefore, it may be necessary for the decision to be made at the highest levels of government. If this level of support is not possible, the country may not be ready to adopt an IMT policy, even if it is found to be necessary and technically feasible. The lessons learned indicate that, sometimes, what is politically feasible (e.g., enhancement), overrides what is really needed (e.g., reform), perhaps due to political resistance from vested interests. Due to pressure from donors, technical assistance agencies and internal interest group, management transfer program may be adopted in environments where it may not be feasible. Planners must determine whether the existing social and institutional situation is conducive to the creation of viable local organizations to provide the water service.

The aforementioned requisites call for a strong political support for irrigation management transfer that greatly facilitates the implementation process. In addition, this political support helps considerably in passing necessary legislation for giving legal authority to organized farmers to assume the management responsibilities for irrigation system (Hamdy, 2004).

The irrigation management transfer experiences of several countries (Skogerboe et al., 2002) indicate that irrigation management transfer is still in the policy or program formulation stage in many countries. Numerous issues need to be addressed and many problems need to be discussed and resolved: policy options that can help resolving some of the major roadblocks to successful transfer program should be developed. However, such policies and strategies should be fundamentally based on appropriate monitoring, evaluation and feedback programs.

In this regard, Geijer (1995) reports six essential conditions for successful irrigation management efforts: strong high-level political support; clear national policy direction; legal basis for new managing entities; economic benefits to the farmers; well defined water rights at the system and farmer levels; and functional irrigation facilities (infrastructure).

Among the learned lessons there is the one concerning the water resources management and what should be the role for a governmental agency. For irrigation management transfer programs and considering the evolutionary role for a governmental agency, the following can be stated:

"The future role of irrigation agencies should not be operation and maintenance, but rather technical assistance in implementing water resources policies"

An irrigation agency should evolve into a water resources management agency. Thus highly qualified staff must cover a wide range of disciplines.

The water resources management agency should sustain a strong capability in irrigation water management to provide the technical assistance to water users' organizations for irrigation system improvement. The remodelled agency should also develop a very strong capability for water resources investigations including groundwater as well as surface water, along with both water quantity and quality. However, such much greater role, other than operation and maintenance, requires some serious thoughts on the initial steps in transitioning from an irrigation agency to a water resources agency, such as:

1) How to enhance the capabilities of the irrigation agency staff?
2) How to handle staff redundancy, particularly for lower level staff?
3) What collaboration with other organizations should be fostered?
4) How to provide technical assistance for agricultural development?

Regarding the major tasks the national water resource management agency has to develop, it implies that the agency must be multidisciplinary with some individuals having background in the social sciences and others in the physical sciences. More important is to develop an interdisciplinary teamwork that should methodically be pursued in both the planning and implementation functions. This is the most difficult task, particularly in a public agency where it is difficult to determine the services of an employee. Thus, national consultants should be used to establish guidelines for interdisciplinary teamwork, as well as, periodically, to participate in the monitoring, evaluation and feedback regarding the IMT program.

MONITORING AND EVALUATION: BASIC CONCEPTS

Monitoring and evaluation are tools for assessing the performance of interventions; in this case, the transfer of irrigation management from government to users. Both are done so that the policy makers and planners can find out how a new program is being implemented at local levels and what its results are.

Monitoring and evaluation will help in analyzing all the system parameters and bringing about changes in operations to the desired standards, to obtain maximum benefits from the project. It also ensures the effective and efficient implementation of the plans. Furthermore, through monitoring and evaluation, other stakeholders, like farmers and local government officials, can know how the program is affecting them. Finally, monitoring and evaluation are the tools of the WUA's enabling them to keep track of happenings in the system and induct changes on day-to-day basis, which would help the organizations to modify the existing irrigation policies and plans to achieve the main objectives for which the association is formed and the system is created. Indeed, regular monitoring is essential not only to assess the progress but also to take corrective steps wherever needed.

Monitoring and evaluation, generally, distinguishes between *Inputs, Process, Outcomes and Impacts* of some intervention or reform programs:

- *Inputs:* can be policies, legislation, plans, financing, human resources and training activities. They are all resources that are mobilized to drive the intervention.
- *The implementation process* is the series of actions and decisions that should be done in order to make the program happen and achieve the objectives and targets specified by reforms.
- *Outcomes* are the immediate or direct effects of an intervention.
- *Impacts* are the ultimate output of reform or intervention.

Both monitoring and evaluation seek to answer the question: *how well are we doing?* However, a clear differentiation should be made between monitoring and evaluation.

WHAT IS MONITORING?

Monitoring generates information for analysis, keeps watch on changes that take place in the physical system, assesses the condition of the components of the system and provokes thinking that well help improving the working of the system. It also helps in verifying whether assumptions made and parameters adopted in the formulation of the operational plan for the system are realized during the actual operation, and if any modifications are necessary**.** It helps in identifying constraints so that timely remedial measures are taken. Monitoring is a valuable tool for improving systems management and efficiency.

The broad steps in monitoring could be outlined in:

- reviewing planned progress;
- identification of constraints;
- taking timely action; and

- planning for future course of action.

UNDP (1997) gave the following definition: Monitoring is a continuing function that aims primarily to provide program or project management and the main stakeholders of an on-going initiative with early indications of progress or, lack thereof in the achievement of program or project objectives.

Monitoring accepts existing objectives and targets as given and assesses to what extent these are being implemented and it asks: *"Are we doing things right?"* If the results of monitoring are properly reviewed and incorporated into the on-going reform process, it should help reformers to make improvements in planning and implementation or, perhaps, to change course.

MONITORING: BASIC CHARACTERISTICS

Any monitoring system should have the following basic features:

- o simple to operate, relatively fool-proof and capable of producing data of acceptable accuracy with acceptable speed;
- o appropriate to the purpose;
- o flexible in application and adaptable to the needs of the project, depending on its size and characteristics;
- o monitoring procedure should be as consistent as possible within existing staffing patterns, data collection, procedures, and
- o it allows judgments to modify the operation plan (OP), if necessary.

The approach in monitoring should be specific, so that the output is visible. The whole process of monitoring has to address itself to four questions. They are presented in (Fig. 1):

I. *What* : which activity to be taken for monitoring?

II. *Who* : who will do this?

III. *When*: at what stage of the activity or intervals/periods, the information is to be collected?

IV. *Whom:* collected information is to be sent to whom?

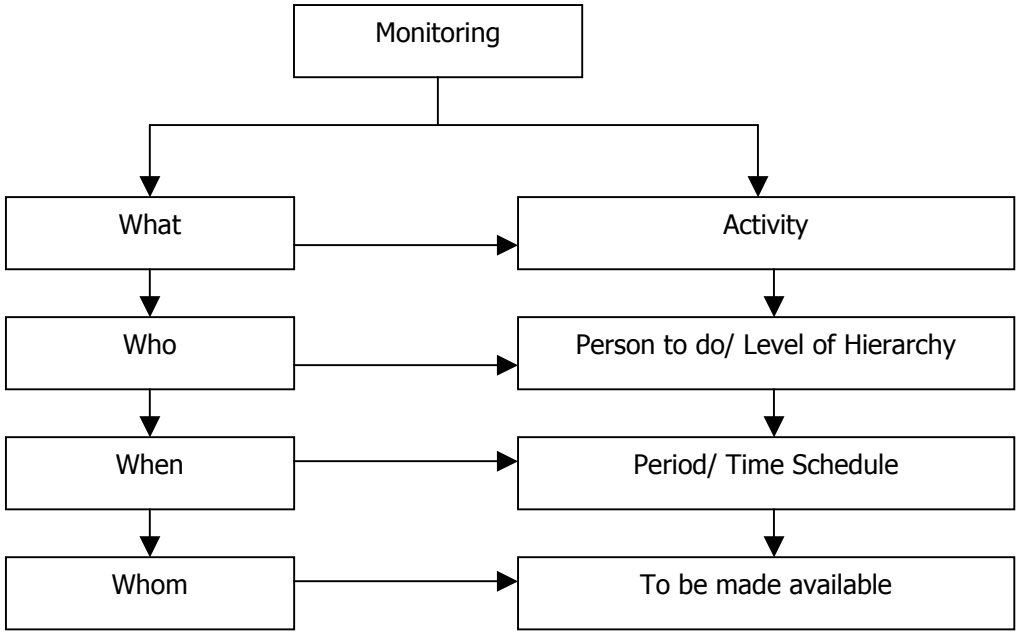

Figure 1. The monitoring chart

In addition, it is of paramount importance that any monitoring mechanism has to gather information regularly, to collocate the data gathered, to provide the compiled data to the concerned for taking appropriate decision, and where required, to follow up for the implementation of the decision.

Also, it is recommended to carry out monitoring with the involvement of each target group. For example, a funding organization may view monitoring and evaluation (M&E) as a way to improve the effective use of funds as a means to monitor progress in implementation.

EVALUATION

UNDP (1997) defines evaluation as a time-bound exercise that attempts to assess systematically and objectively the relevance, performance and success of on- going and completed programs and projects**.**

It is a process to methodically analyze the functioning and performance of an irrigation system and the organization managing the system. It provides an opportunity to identify the components that are not performing well.

Evaluation focuses on determining whether or not the intervention is producing the intended outcomes and impacts its proponents expect. Evaluation asks: *"Are we doing the right things?*

The purpose of evaluation is to quantify the achievements and identify the areas of deficiency to enable to take up corrective steps. Findings from an evaluation can enable policy makers to assess whether the reform was appropriate or not.

Together, M&E enable us to determine whether successes or failure are the results of what was done, how it was done or other extraneous factors.

APPROACHES TOWARD M&E

GOAL ORIENTED M&E

Examples of this approach are Casley and Kumar (1988) and Murray-Rust and Snellen (1993). This approach translates the goals and objectives contained in official policy documents into specific indicators for M&E. It is regarded as the most conventional and, in some ways, is shown to be the simplest approach. This approach tends to be, primarily, quantitative, relatively efficient and it can be applied over a wide area. However, its mean weaknesses are that it tends to have blinders against detecting unexpected results, and it undervalues outcomes that are not specified in policy goals.

MULTI-PERSPECTIVE M&E

This approach may involve representatives of all key stakeholders as equal partners in the design, identification of indicators, implementation and analysis of results of an M&E system. It tracks progress and new developments according to these diverse perspectives. It tends to involve multiple methods and more opportunities for involvement of stakeholders in information gathering and review of results and thereby seems to be more comprehensive than goal-directed M&E. However, such approach is rather costly and implies the establishment of clear priorities to avoid having a very long list of indicators. Examples of this approach are Narayan (1993) and Gosselink and Strosser (1995).

The multi-perspective M&E is often used in combination with goal-directed M&E. This can complement the strength of other methods to generalize with the strength of multi-perspective M&E to understand local perspectives and dynamics.

PARTICIPATORY MONITORING AND EVALUATION (PME)

PME is a concept which recognizes the fact that farmers and their organizations have a prominent role in the process of irrigation water management and utilization to optimize irrigation use efficiencies, improve agricultural production and improve the economic well-being of all farmers, particularly the tail-end farmers within the command area.

Participatory and participation are words that mean:

- an active process where farmers take initiative and assert for autonomous functioning;
- sensitization of farmers to increase their ability to respond to the needs of the irrigation system management and operations;

- spontaneous and voluntary involvement for self-determined improvement through proper maintenance and operation of the system;
- fostering a dialogue between the irrigation authorities and other farmers' organizations for proper management, and
- a voluntary contribution by farmers in the form of money or material without lacking part in decision-making.

Participatory monitoring and evaluation is an adoptive, dynamic, exciting and creative approach for sustainable development of WUA. It is a combination of a purposeful concept, packed-up method in implementing the activities and has participatory tools for information gathering. It also needs commitment of the organization on: sustainability, self-help and personal involvement.

This form of M&E has the potential to produce more in-depth understanding of local knowledge and circumstances than does a uniform goal-directed approach. It has greater potential to discover the unexpected and the perception of local people.

M&E: GUIDING PRINCIPLES

It is complicated to provide specific guidance in how to design an M&E system for IMT program since every country that decides to follow a PIM policy has a different set of objectives. Any evaluation of the program must take into consideration such objectives in designing the corresponding M&E system. Vermillion and Sagardoy (1999) make some general recommendations on how to design such a system:

1) Follow a minimalist approach – only use indicators that satisfy the following criteria:
   - they are key aspects of implementation (i.e. performing tasks and meeting targets);
   - they inform about essential outcomes and impacts;
   - they do not exceed the optimal amount of information that can practically be absorbed by planners;
2) Select indicators which are information efficient;
3) Distinguish between top and bottom directed needs for monitoring;
4) Distinguish between those few indicators for which data must be collected from all sites versus those for which sampling may be sufficient.

ORGANIZING AND IMPLEMENTING M&E: BASIC STEPS

Key decisions in developing and implementing a monitoring and evaluation system is shown in Fig. 2. It shows a series of eight key steps or considerations that need to be made to design and implement a monitoring and evaluation system. This is not a blue print and the steps do not have to be done in consecutive order, as presented here. They may be done simultaneously or in different order, as may be needed in some settings (Vermillion, 2000).

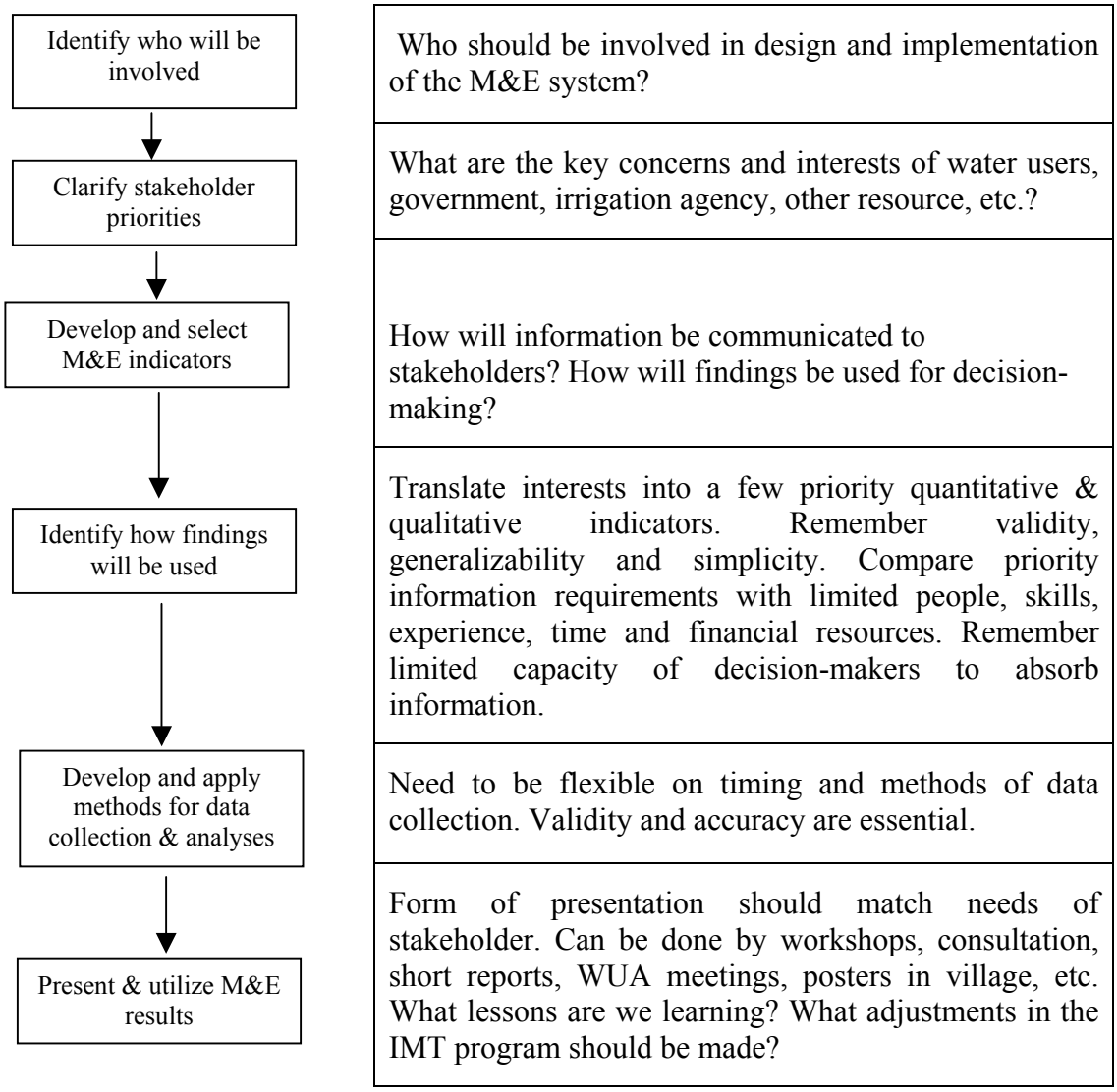

Figure. 2 Key decisions in developing and implementing a Monitoring and Evaluation System

On the globe, experiences gained emphasized the importance of information in guiding the design and implementation of M&E system. Major weights should be given to the validity, relevance of information and to its efficiency. This will help the organizers of the M&E systems to have appropriate indicators easy to interpret for each important aspect of the program inputs, implementation, outcomes and impacts that need to be monitored or evaluated.

In a more participatory reform process, key stakeholders will generally play some role in designing the M&E system, especially in identifying indicators and using M&E findings to make decisions about the reforms.

Following a participatory M&E process will give the target groups a genuine input into developing indicators to monitor and measure changes as well as allowing for the M&E process to be owned by the group, rather than imposed on them by outsiders.

To facilitate this task, which is a relatively difficult one, organizers of M&E should not select too many indicators or try to collect more data than can be managed and presented to busy people.

Often the irrigation agency provides staff who conduct monitoring and evaluation. In some cases, where IMT is politically sensitive and controversial, it may be better for a third party, "Universities or NGO's", those neutral bodies not directly involved in implementing the IMT program, to conduct the M&E program. Having neutral partners, who have training in M&E or research methods, conduct M&E data collection and analysis, may ensure greater independence, objectivity, transparency and credibility of the findings.

Monitoring and evaluation IMT system is generally facing the problem of how the results are utilized to make changes in the program. In this regard, it is advisable that before the M&E system is set up, there should already be organizations, committees, communication channels and decision-making bodies to receive and deliberate on the findings. Further, it is recommended to involve farmers in committees that review M&E findings and make IMT timely adjustments and enhancements when needed.

M&E: DEVELOP AND SELECT INDICATORS

Before deciding on the indicators to be selected to be used for monitoring and evaluation a two-step process should be followed:

The first is to determine what are the key interests and concerns of the different stakeholders about the implementation outcomes and ultimate impacts of IMT. This is a preliminary step toward identifying indicators for M&E;

The second is to identify how the findings from M&E will be used. This step helps preventing M&E organizers from producing an overload of information that is unnecessary, irrelevant, and excessive and not responding to the stakeholders' interest. For instance, IMT planners and technical experts may be most interested in monitoring the timing and cost of implementation, including such aspects as how many WUA's have been organized, how many schemes have been turned over, how much area has been rehabilitated, etc.

The policy makers and donors may be more concerned with out comes and impacts, such as ability of WUA's to take over O&M tasks and effects of IMT on the quality of O&M.

Farmers will have other different interests mostly concerning the effect of IMT on their cost of irrigation and the productivity and profitability of irrigated farming.

Once the M&E organizers have identified key information needs of stakeholders, the next step to do is to translate these into measurable indicators. This can be done in a two-step process: the first, is to identify a core set of performance criteria using the broad and outcome objectives for implementing IMT program. The following are

probably the five most common and important objectives for implementing IMT program:

- o to provide essential rights and authority to WUA's to take over management;
- o providing training and other support to facilitate creation and development of WUA's;
- o to make physical improvements to irrigation infrastructure;
- o to transfer management responsibilities to WUA's;
- o to provide training and new capacity building to the irrigation agency.

The most commonly mentioned outcome objectives for IMT are :

- o to contain or reduce the cost of irrigation;
- o to achieve financial self-reliance of irrigation system;
- o to improve the quality of water delivery performance;
- o to improve the quality of system maintenance.

In the following steps, specific measurable indicators are derived from the set of performance criteria as given in Table (1). The table illustrates a simplified guide and is not an exhaustive inventory of all possible objectives, performance criteria and indicators for any given location.

Table 1. Performance criteria and INPIM M&E indicators

Indicator listing	Performance criteria	Number of indicators
Process Indicators	-Water Users'Associations (WUA's)	23
	-Operation and Maintenance (O&M) Activities	11
Totally: 63 Indicators	-Irrigation Department	8
	-PIM Policy and Reform Program	21
	-Water Users' Associations (WUA's)	23
Outcome Indicators	-Irrigation Operation and Maintenance (O&M)	14
	-Irrigation Department	5
Totally: 47 Indicators	-PIM Program and Irrigation Sector	5
Impact Indicators	-Irrigated Agriculture	11
	-Rural Livelihood	5
Totally: 24 Indicators	-Environmental Impact Indicators	8

In this regard, as a reference, the combined list of potential M&E indicators and performance criteria for IMT or participatory irrigation management generated by participants at the *Fifth International Seminar on Participatory Irrigation Management* held in Hyderabad, India on December, 1999 is recommended. The INPIM seminar

listed the M&E indicators in the form of performance criteria as process, outcome and impact indicators.

As shown in Table 1, the indicators listed by INPIM are of a relatively high number amounting to 134, and covering the different proposed performance criteria. The different listed indicators proposed, related to each performance criteria, are cited by Vermillion (2000) in the JIID, INPIM publication: *"Guide to Monitoring and Evaluation of Irrigation Management Transfer".* Monitoring and evaluation of the IMT programs does not require using such ample number of indicators, but it needs selecting the ones that satisfy the objectives of the program. The diversity of irrigation systems is large and any monitoring system may hardly be satisfactory for all of them. It would be more appropriate to develop evaluation systems for each main type of irrigation system. As an example, defining the objectives for the irrigation system operation is not an easy task.

Considering the most relevant objectives related to some specific systems - as reducing the losses of the irrigation system, satisfying crop irrigation requirements, distributing water timely, measuring the water delivered accurately - the indicators related to the objectives are given in Table (2).

Table 2. System operation objectives and related indicators

Objective	Indicators related to the objective	Time period for application of indicator	Remarks
1. Reducing the losses of the irrigation system.	Total losses = Total volume of water supply at the head of the system - Total volume of water delivered at farms	decade monthly peak demand, annually	Total losses include operational losses
	Efficiency of the distribution system* $= 1 - \frac{Water\ losses}{Total\ volume\ of\ water\ \ supplied}$	Decades monthly peak demand, annually	Time evolution of efficiency provides relevant information
2. Satisfying 100 % of crop irrigation requirements	Relative irrigation supply** $= \frac{Irrigation\ water\ delivered\ at\ farm \times farm\ efficiency}{net\ irrigation\ requirements}$	decades peak demand, annually	The critical period is peak demand
	$\frac{Canal\ capacity}{Peak\ Irrigation\ demand}$	Peak period	It should be determined for all canals
3. Distribute the water timely	$\frac{Number\ of\ irrigations\ given\ per\ main\ crops}{Number\ of\ irrigations\ required\ per\ main\ crops}$	End of irrigation season	It should be determined for main crops
4. Measure the water delivered accurately	$\frac{Total\ volume\ of\ water\ delivered\ at\ farm\ level}{Total\ number\ of\ hectares\ irrigated}$	Monthly, seasonally, annually	The total volume should be the sum of the volumes delivered at every farm
	$\frac{Number\ of\ offtakes\ \ calibrated}{Total\ number\ of\ offtakes}$	Annually	It provides an indication of the capacity of the system to measure water

* In addition to the efficiency of the system it will be useful to determine the efficiencies of the delivery canals using the same type of equation

** This indicator is sometimes expressed in somewhat different forms

Source: Sagardoy (2203).

LESSONS ABOUT MONITORING AND EVALUATION

Over the years, the monitoring and evaluation strategies have evolved toward the combined use of internal monitoring and external monitoring evaluation with attention paid to the development of user associations' capacities to monitor their own performance.

The review of various monitoring and evaluations led to the identification of some key lessons:

1. All key stakeholders must participate in the development of the various elements of the monitoring framework. This helps in identifying the projected use of monitoring information and the various ways that findings will be communicated to stakeholders. It also ensures that only relevant and useful information is collected.
2. When various monitoring activities are carried out by different stakeholders, it is important for them to be conducted on the basis of the same indicators and parameters, so as to allow for comparisons and to benefit from the complementary nature of the information collected.
3. Monitoring data from previous projects and baseline information must be used to inform the development of the performance review framework.
4. Monitoring must be iterative and thus monitoring frameworks must be tested through field research before they are made official.
5. Developing a comprehensive monitoring strategy useful for decision-making, while keeping it simple enough to guarantee its ongoing implementation, requires that all stakeholders agree on a limited number of key areas to monitor.
6. The overall performance of the user associations needs to be continually assessed, internally and externally, to ensure their adequate development and the maintenance of their capacities over time.
7. The user associations should be empowered to resolve problems themselves. Otherwise their role is limited to the collection of data to be used by other organizations.
8. The incorporation of project-level monitoring data into a national monitoring system remains a challenge for many government agencies.

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