

MONITORING AND EVALUATION OF IRRIGATION PROJECTS

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ABSTRACT: Monitoring and evaluation of irrigation projects has been a neglected subject, but must play a more important role in the future if the irrigation management process is to be improved. The process is complex, since a large number of regular, specific tasks must be performed, both concurrently and sequentially, and coordinated by a variety of professionals within available time and resource constraints. The paper points out the need for monitoring and evaluation, outlines the main requirements for a functional system, and provides a realistic framework for carrying it out. For any evaluation to be used, it must be credible—objective, accurate, and fair. Reports should be clear, unambiguous, balanced in terms of strengths and weaknesses, and contain justifiable conclusions and recommendations. For monitoring and evaluation to succeed, irrigation managers need to develop a new evaluative mind-set that enables them to appraise their projects' performance objectively, reflect on what has been learned for future use, and adjust policies on the basis of that knowledge whenever necessary.

INTRODUCTION

There has been considerable controversy in the recent past over the desirability and efficiency of irrigation projects. The proponents of irrigation projects have pointed out that implementation of such projects not only increases the total food production of an area when compared to rainfed agriculture but also significantly improves the reliability of the production process by ensuring proper water control. It has been estimated that even though only about 20% of the world's agricultural land is irrigated at present, this accounts for 40% of the global agricultural production. In addition, irrigation provides the basis for a better and more diversified choice of cropping patterns and growing of high value crops, which otherwise may not have been possible. The water control structures built for large-scale irrigation projects often also simultaneously generate hydroelectric power and control floods, which further add to the national economic development process. Since globally irrigation is the largest consumer of water (about 80% of all water used), and hydropower generation does not consume any water, these two are compatible uses of water.

On the negative side, opponents have claimed intense disappointments with the results of irrigation projects during the past two decades, due to high costs of projects, cost and time overruns, poor management, nonrealization of full planned benefits, adverse environmental and health impacts, and exacerbation of differences of the existing social and economic distribution of assets among the farmers.

An important reason as to why irrigation projects are currently generating simultaneously both extreme optimism and pessimism is due to the absence of regular monitoring and evaluation processes that can clearly and unambiguously identify the impacts of the projects.

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Monitoring and evaluation have received much lip service in the present decade, but have seldom been carried out properly and effectively. Indeed besides some rhetoric, one would be hard-pressed to identify a single irrigated agriculture development project that has been monitored and evaluated properly and regularly, and where the results of monitoring and evaluation are used to improve the management of irrigation projects in order to ensure that the expected benefits do accrue within the planned time horizon. The present state-of-the-art review is based on the writer's experience as an advisor to 17 developed and developing countries and all major international organizations involved with irrigation.

In the context of the present paper, monitoring may be defined as continuous or periodic surveillance over the implementation of the necessary irrigated agricultural activities, including their various components. It is used to ensure that work schedules, input deliveries, targeted outputs, and other required actions are progressing according to the plan. Since the primary purpose of monitoring is to achieve efficient and effective project performance, it should be considered an integral part of the management information system, and thus should be a regular internal activity. Evaluation may be defined as a process that determines systematically and objectively to the extent possible, the impact, effectiveness, and relevance of project activities in terms of their objectives.

There are two points worth making here. First, evaluation can broadly be divided into two broad categories: ongoing and periodic. Ongoing evaluation is a continuing activity and is used to examine whether any changes are necessary for the operation and management of a project to ensure that its performance is satisfactory and the overall objectives can be achieved. For example, it is possible that in certain cases the assumptions underlying the irrigation design may have been inappropriate such that the farmers are not receiving their expected share of water. If through the monitoring and evaluation process this or similar types of problems can be identified, the question arises what measures can be taken to rectify such problems.

In contrast to ongoing evaluation, periodic evaluation is carried out after longer time intervals, e.g., every five years. Periodic evaluation generally deals with achievement of socioeconomic objectives, which may not show any discernible or significant change over a shorter period of time of one year or so.

The second point is with reference to the base with which project impacts or changes can be compared. Vary often reliable socioeconomic data on preproject conditions in developing countries do not exist. Furthermore, project objectives as originally outlined may be fuzzy, inaccurate, or may not be sufficiently quantitative for evaluation purposes. Many times objectives may require redefinition or sharpening of focus in the light of experience gained since a project was initiated. Thus, for evaluation purposes, blind adherence to initially stipulated objectives may be counter-productive.

It can be persuasively argued that if the existing performance patterns of irrigated agriculture projects in achieving their objectives are to be improved significantly, it is essential to ensure that monitoring and evaluation become an integral component of the management process in order first to determine their achievement levels and then to identify what adjustments and corrective

actions may be necessary to ensure that the future stream of benefits accrue in time to the appropriate target groups.

Some form of monitoring and evaluation is always done for irrigation projects. For example, most project authorities monitor the flow rates in the main irrigation canals, but they may not have corresponding data on watercourses. Often losses occurring in watercourses are not known, and if such losses are higher than designed values, reliability of water availability to the farmers at the tail of watercourses declines significantly. In addition to certain irrigation factors like flow rates, some agricultural aspects such as crop yields may be monitored, but even these may not be monitored on a regular basis. When one moves from physical factors to socioeconomic factors, the status of monitoring and evaluation gets even worse. One would indeed be hard-pressed to identify one single irrigated agriculture project where its impacts on the lifestyles of the intended beneficiaries have been evaluated at regular intervals.

Regular and reliable evaluation of irrigated agriculture projects, however, is not an easy task under the best of circumstances. There are methodological problems that need to be resolved in order to find a cost-effective and reliable approach that can be used for the evaluation of a specific project within the resources and expertise available. Even when methodological problems can be resolved, there are other important barriers like institutional inertia, and sometimes even downright opposition, that have to be effectively overcome before a serious evaluation can be undertaken that could be a part of the management process.

While limited literature exists on the integrated monitoring and evaluation of irrigated agriculture projects (Biswas 1987; Sagardoy 1985), there are unfortunately more reports available on pseudo evaluation or superficial evaluation that have been carried out in the recent past at both national and donor agency—both bilateral and multilateral—levels. These reports are more concerned with the protection and enhancement of the reputation of the organizations concerned, both within and outside countries, and the individuals associated with the projects. These types of evaluations cannot have a beneficial impact on the management process since they either do not identify major problems and bottlenecks, or if they do, their importance is significantly downplayed. Unfortunately, far too many pseudo- and superficial evaluations are being carried out at present, which in the long run is not only detrimental to society but also reduces the effectiveness of irrigation projects as well as the perceived usefulness of the monitoring and evaluation process.

A comprehensive and objective analysis of the experiences of the United States Agency for International Development of irrigation projects supported by them in various developing countries indicated that monitoring and evaluation practices of both donor and recipient countries have “come in for criticism from each group about its own organization and about the activities of its counterpart,” and that “too little gets done by either group” (Steinberg 1983).

In view of unprecedented controversies in recent years on the efficiency and even the desirability of irrigation projects, it is essential that objective evaluations be considered mandatory, both to get reliable status reports on the operation of and benefits from the schemes and to use the results to

improve the management processes further in order that impacts on beneficiaries are maximized.

Why Monitoring and Evaluation?

There are many reasons to carry out systematic monitoring and evaluation of irrigation projects, the principal ones of which are the following:

1. To determine the extent of achievements of the goals of a project by assessing actual impacts and then comparing them with expected impacts.
2. To obtain information as to why a project may not have had anticipated impacts by identifying the magnitude, extent, and location of the problems in order that corrective actions may be taken to maximize the beneficial project impacts.
3. To increase the understanding of the management of the various interlinked processes and issues involved so that the resulting enhanced management understanding can be translated into action in terms of immediate, observable, concrete decisions.
4. To verify the relevant project assumptions.
5. Lessons can be learned to improve planning, implementation, and management of similar projects elsewhere.
6. To plan later phases of the project more effectively, based on the evaluation of the performance of the first phase.
7. To contribute to the modification of the organizational behavior on the basis of relative successes and failures of projects at various levels.
8. To provide facts and success stories at the ministry or department level that can not only defend existing policies and programs but also may assist in getting additional financial support.
9. To provide national policy-makers with objective information in order that they can decide to what extent such activities can be continued in other parts of the country.

It should be noted that the reasons outlined for carrying out monitoring and evaluation are not mutually exclusive since they are often interrelated. Equally, it is not enough to identify and analyze the technical, social, and economic aspects of the various issues and problems; it is essential that both institutional arrangements and constraints be reviewed as well, since it is the institutions concerned which in the final analysis have to develop ameliorative policies and implement them.

On the basis of reviews of irrigation projects in many countries, it is clear that no one is satisfied with the present status of irrigation planning and management in terms of monitoring and evaluation. The problems appear to be many-faceted, among which are the following:

1. Decision-makers claim that they have no clear idea as to what real impacts the irrigation projects have had on the anticipated beneficiaries, or even on the nature and extent of the real beneficiaries.
2. Planners point out that they have no objective information on how past planning of irrigation projects has fared, and without any reliable feedback they cannot improve the existing planning process.
3. Managers state that they cannot make appropriate timely decisions since the information they receive is generally unusable and of little help (too little,

too much, irrelevant, unreliable, or too late).

4. Engineers and administrators believe that they are already overworked due to routine administrative chores, preparing numerous reports that are administratively necessary but that very few people appear to read, their required presence at numerous unproductive and questionable meetings, and other similar tasks that do not leave them with much time to carry out their real functions.

5. Evaluators feel that their works do not receive proper attention, and what is more, that they are not given enough resources or time to carry out their tasks efficiently.

6. Officers of funding agencies complain that they have no clear idea on the effectiveness of the projects and accordingly have difficulty in making correct decisions on the funding of new projects.

A realistic assessment of the current status of monitoring and evaluation of irrigation projects would indicate that virtually everyone associated with such projects believes that evaluations are essential and beneficial, but in reality the rhetoric overwhelmingly exceeds actions. Organizations appear to spend more time on planning exercises and training programs on evaluation than on carrying them out properly. This unsatisfactory situation must be improved.

MONITORING AND EVALUATION REQUIREMENTS

There are some fundamental requirements for designing any monitoring and evaluation system for an irrigated agriculture project. Among the primary requirements are the following: (1) Timeliness; (2) cost-effectiveness; (3) maximum coverage; (4) minimum measurement error; (5) minimum sampling error; (6) absence of bias; and (7) identification of users of information.

Timeliness

Most management decisions have a time dimension, even though the timeliness of making some decisions may be more important than others. For example, if farmers at the tail ends of watercourses are not receiving their share of irrigatiogn water regularly, or if fertilizers and pesticides are not available at the right time of the cropping season, it is necessary that immediate remedial measures be taken. If not, a poor harvest results, and the income foregone by the farmers will never be recovered. Thus, it is essential that information collected reaches the appropriate decision-makers on time so that rational decisions, based on the data monitored, can be made in time to help the farmers. Accordingly, for a rational management system, monitored information should be channeled in a timely fashion so that it can be converted into decision and action.

It should be noted that the management success depends not only on the timeliness of the information but also on the quality, extent, and the form in which the information is channeled into the decision-making process. A problem often arises because even if the required information has been collected, it could not be channeled into the decision-making process since it is either in a diffuse or inappropriate form or could not be obtained and analyzed within the timeframe by which decisions should be made. In a review of monitoring and evaluation systems of irrigated agriculture projects (Biswas 1987), it was found that in many schemes, preseason crop-related

information was not even analyzed before the end of cropping seasons. Under such circumstances, monitoring and evaluation can only have a limited impact on the overall performance of projects.

The danger is that if monitoring and evaluation information from the project does not reach the managers on time, it is likely that one or more of the following consequences, which are not mutually exclusive, may occur:

1. Wrong action may be taken.
2. Decisions taken may not be optimal on a long-term basis.
3. No action may be taken when action is desirable.
4. The decision taken may result in irreversible damage.
5. The decision taken may unnecessarily increase the cost and timeframe required for the resolution of a specific problem.

It is therefore essential that a monitoring and evaluation system for an irrigated agriculture project be set up in such a fashion that relevant information in usable form reaches the people who need it on a continuing and timely basis.

Cost-Effectiveness

Information collection, processing, analysis, and scaling requires financial resources, expertise, manpower, and equipment. Since the ready availability of all these resources in developing countries is limited, any monitoring and evaluation system designed for irrigated agriculture should be cost-effective. This essentially means a sensible trade-off between the depth and context of information to be collected as well as between amount, relevance, and accuracy. As a general rule, it can be said that the overall value of information collected in terms of use should exceed the cost of obtaining that information.

For most projects, from a management viewpoint at any specific time, the value of information generally increases with the increasing extent and accuracy of information available. The value of information for most decisions, however, generally approaches a plateau at a certain stage, beyond which it increases only marginally. In contrast, the cost of obtaining information continues to increase with more coverage and higher accuracy. This is diagrammatically shown in Fig. 1. The shaded area in Fig. 1 is the cost-effective zone, beyond which the cost of obtaining information will rapidly exceed its intrinsic value. Exactly where within a shaded area a decision should be made depends on a variety of factors such as type of projects, management experience, and potential impact, but such trade-off considerations are often made on the basis of value judgments.

There is often a tendency to collect more data than necessary. For any monitoring and evaluation process to be efficient and cost-effective, it is essential to have a clear idea about who is going to use the data, what types of data are necessary, how the information is to be used, and when and in what form the data should be made available. Without such a clear focus, unnecessary and nonessential data may be collected, which is an expensive luxury all countries can do without.

While data collection processes need to be carefully integrated within the monitoring and evaluation framework, consideration and desire for scientific rigor should be balanced with the need for timely information. This in reality

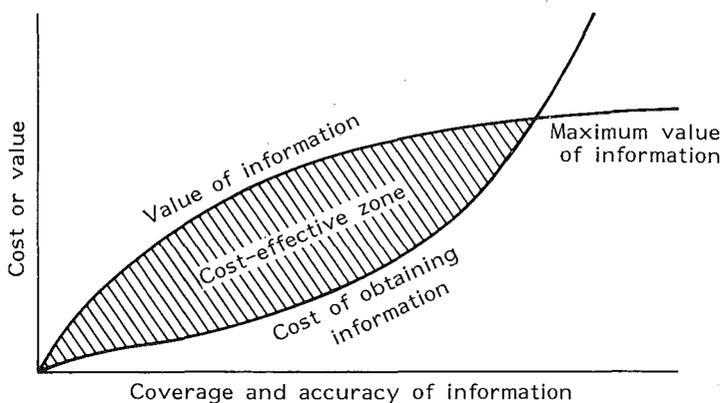


FIG. 1. Cost-Effectiveness of Monitoring and Evaluation Information

often translates into a trade-off between accuracy and reliability with cost. In the final analysis, the value of information for the decision-making process becomes the key factor to resolve this trade-off.

Maximum Coverage

For monitoring and evaluation of irrigation projects, especially large ones, a major difficulty arises from the fact that a wide area may need to be covered, wherein it may be necessary to get an objective view of the operation of the irrigation system and its impacts on agricultural production and the overall quality of life of the people in the area. Thus, maximum coverage taken literally may prove to be an expensive, complex, and time-consuming process.

As a general rule, sociologists and anthropologists prefer to have as much breadth of coverage as possible. However, given high resource costs of manpower, time, transportation, and other related factors, as well as high opportunity costs, a decision may often be necessary to have limited coverage on selected variables, and then use the balance of available resources to obtain more detailed information on specific aspects and/or areas that are critical from a management viewpoint. Accordingly, maximum coverage in the present context should be interpreted to mean collection of maximum data that are necessary and will be used for management purposes, subject to resources (funds, manpower, expertise, equipment, and time) availability.

Minimum Measurement Error

The level of accuracy and reliability of any data that will be collected is an important consideration for any monitoring and evaluation process. Generally, engineers and physical scientists are more concerned with the accuracy of measurements and data collected than sociologists and anthropologists. For irrigated agriculture projects, measurement error could be a real problem when small farmers and landless laborers are being considered. They are often illiterate and may have some difficulty with precise numerical quantifications. Accordingly, they may not be reliable or even somewhat vague about the rate of changes, especially when the changes are within the

order of 15–20% and some time has elapsed between the two periods in time that are being monitored. The enumerators and data collectors should be aware of this potential problem and attempt to ensure that the changes are properly reflected.

Minimum Sampling Error

Since it is neither necessary nor desirable to monitor all possible developments in the project area, sample surveys are essential. Irrigated agriculture projects cover numerous issues and diverse disciplines, and accordingly there is no straightforward or uniform solution as to what may constitute suitable sample size. For example, for analyses of rainfall, one rain gage per square kilometer may be considered to be a very dense network, and thus totally unnecessary unless very exceptional circumstances warrant it. In contrast, an identical sample size may be totally unacceptable to sociologists. In the final analysis, determination of sample size will depend upon the type of information to be collected and the use that will be made of it.

Absence of Bias

Monitoring and evaluation of irrigated agriculture projects often suffer from biases of people performing the task. This happens because evaluators, often due to their disciplinary orientation, expertise, and past experiences, may have the tendency to concentrate on specific issues at the cost of other issues that may be of similar importance. Among the common biases observed are water entering watercourses but not losses, irrigation but not drainage, fields near roads along canals and watercourses but not those to which access is difficult or uncomfortable, review during healthier, better-fed dry seasons when climate is pleasant but not during food-scarce, unhealthy, unpleasant, and wet seasons, and interviewing large farmers or men but not small farmers or women. Equally, there is a danger that biases may be introduced in terms of one's discipline, since undisciplinary people often tend to concentrate on areas that are of primary importance to them.

It should be noted that in a real world, an issue is an issue. It is often labeled engineering, economic, social, or legal depending upon an individual's discipline, experience, and ways and means of approaching it. Thus, ideally, evaluations should be carried out by multidisciplinary people, who may specialize in one discipline but are knowledgeable in other disciplines. They should be flexible, observant, sensitive, eclectic, and constructive. They should be capable of intermixing freely and questioning sympathetically and inventively. Since, in reality, such qualified and experienced individuals are very difficult to find, one may have to depend on who is available. To a certain extent, the problem can be resolved by carefully choosing a multidisciplinary team, which may offset biases of individual members by the juxtaposition of the insights of various disciplines. Past experiences indicate that use of multidisciplinary teams for monitoring and evaluation of irrigated agriculture projects, where team members are not familiar or do not have established working relationships with each other, generally do not produce an integrated multidisciplinary approach or report.

Identification of Users of Information

If the results of any monitoring and evaluation are to be actually used, it is necessary to identify who are going to be the users of information and

their information requirements before designing a monitoring and evaluation system. At the different levels of management, the hierarchy of information needs is different. For example, at a certain level of management, detailed information on a specific aspect of an irrigated agriculture project may be necessary, whereas at other levels (generally higher), aggregated information may be required. It is necessary that the right type of information be provided to the appropriate levels.

For any utilization-focused evaluation, after identification of relevant information users, it is desirable to: (1) Actively involve the users in ways that would increase their commitment to the utilization of evaluation finds; (2) train users to increase their understanding of evaluation and make it possible for them to play a useful role in the evaluation process; and (3) provide genuinely useful information to the users so as to reinforce their future commitments to evaluation.

Trade-Off between Requirements

The principal requirements discussed should not be considered individually in isolation since some may reinforce each other and thus are mutually supportive but others may be in conflict. The quality of any monitoring and evaluation system is determined by not any one of the requirements but rather how effectively all these factors are integrated into one system. For example, there is always a trade-off between maximum coverage, minimum sampling error, minimum measurement error and cost, and these trade-off decisions are generally case-specific. There is no universal clear-cut solution.

There is sometimes a tendency to emphasize one or more of the requirements at the cost of others because of bias. A good example of this is the monitoring and evaluation of agricultural projects and programs in Nigeria during the past ten years that were funded by the World Bank (Lai and Felton 1986). Massive resources were devoted to monitoring and evaluation activities, and equally massive amounts of data were collected by the Agricultural Projects Monitoring Evaluation and Planning Unit (APMEPU), which was established in Kaduna in 1975 to coordinate the monitoring and evaluation activities of the various Agricultural Development Projects/Programmes (ADP). In spite of such intensive efforts by APMEPU, the impact of the ADPs on food production or consumption is far from clear. A major problem arose because of APMEPU's overriding emphasis on minimizing sampling errors. This contributed to a lop-sided approach that gave high priority to statistical considerations but low priority to other requirements and consideration of resources available to perform all the monitoring and evaluation tasks. While the sampling error was minimized, all types of other errors were introduced at a level that was unacceptable. This meant data massaging, further analysis and reanalysis, which not only took time but also contributed to the development of a credibility gap between the unit and project management and other users of information. It is thus essential that a cost-effective monitoring and evaluation system be developed that provides information required by managers in a timely fashion, subject to resources and manpower constraints. Development of an effective system is an evolving process that requires regular, good feedback between the monitoring and evaluation unit and users of the information.

In addition to the requirements discussed, it should be noted that in a real world compromises must be made, as in an ideal marriage, between the

requirements identified, empirical techniques used, various types of professional expertise available, and practical constraints like cost, time, and political and institutional factors. This may even require the consideration of a second-best monitoring and evaluation package that may be more attuned to what is possible in practice. However, in such a pragmatic approach, practical considerations should not justify the dismissal of technical requirements; on the contrary, technical factors may become even more important when one may be forced to use a less desirable approach.

FRAMEWORK FOR MONITORING AND EVALUATION

Monitoring and evaluation of irrigated agriculture is a complex process since a large number of regular and specific tasks must be performed, both concurrently and sequentially, in a coordinated manner, by a variety of professionals, within available time and resource constraints. Furthermore, potential decisions made by local, national, regional, and international institutions may have a direct bearing on the project.

Three issues are worth pointing out here. The first pertains to the physical boundary within which monitoring and evaluation should be conducted. While hydrological or political boundaries may be comparatively easy to define, they are not the boundaries within which all project benefits and costs, both direct or indirect, are confined. Generally, most of the project-related physical variables are confined within the project boundary, but aspects like migration, trade, or environmental impacts often have implications far outside the project area. Accordingly, it is not an easy task to define the boundary within which impacts should be evaluated.

The second issue is the time dimension, which is another complicating factor. Some impacts are immediate, visible, and quantifiable, and thus can be identified and considered within the monitoring and evaluation process. A few other impacts, however, may be slow to develop, and thus may not be easy or possible to monitor meaningfully in the early stages. For example, some unanticipated impacts on the ecosystem, environment or health, may develop slowly and could take more than a decade before they could even be identified and thus before their monitoring could begin. Similarly, salinity problems under certain circumstances may take 15–20 years to develop, but in other cases may take only two- to three years depending on physical conditions, drainage provided, and effectiveness of the management process. Thus, irrigated agriculture projects need regular monitoring and evaluation, even when the projects appear to be functioning efficiently for several years. The time dimension also makes intercomparison of impacts of different irrigation projects a difficult task.

The third issue worth noting is that the present paper deals primarily with monitoring and evaluation of projects. There is, however, another important aspect, monitoring and evaluation of programs. While conceptually the requirements for monitoring and evaluation of both projects and programs may be similar, the clients are often different and the type of information, including level of aggregation, may have wide variations. Since different irrigated agricultural projects have different levels of impacts, at the program level monitoring and evaluation must be so designed in order that policy-makers get clear answers to questions such as what aspects of a program are doing especially well or poorly, what are the bottlenecks, and whether

the designated beneficiaries are benefitting from the program and, if so, to what extent. Such program evaluation would generally cover many projects across a country, and thus it is necessary that the observers of each project be trained to gather data in the same manner, using identical procedures and means. They should interview similar types of sources and pose similar questions. Without such compatibility, it is not possible to provide meaningful and credible information to policy-makers, who can then assess how effective the program is and how it can be improved.

In terms of a rational monitoring and evaluation framework, irrigated agriculture projects can be categorized into four interrelated levels: (1) Planning, design, and construction of physical facilities; (2) operation and maintenance of irrigation and drainage facilities; (3) agricultural production; and (4) achievement of socioeconomic objectives.

An important aspect to note is that these four levels are not sequential: they are generally simultaneous. For example, for large-scale irrigation projects, which often take 8–20 years for planning, design, and construction phases, irrigation to new areas is introduced in sequence. Accordingly, construction of some physical facilities may be continuing in one area, when another area may be receiving irrigation. Thus, the project will have all four levels of activities simultaneously. However, the first level is a discrete phase, which is completed as soon as the construction of physical facilities is over. In contrast, the rest of the three levels require regular monitoring and evaluation during the life of a project to ensure that the overall system is being managed at the desired efficiency and that the objectives of the project are continuing to be met.

Planning, Design, and Construction of Physical Facilities

Of the four levels, activities at this level are probably the easiest to handle methodologically in terms of monitoring and evaluation. This is also an area where some form of monitoring and evaluation has always been a standard practice. Engineers generally monitor progress in planning and design of the project, availability and use of equipment and construction materials, progress in the construction of various physical facilities and how they compare with the planned schedule, project expenditures at regular intervals, and manpower availability and construction schedule.

Evaluation at this level has special significance for large-scale water development projects, where irrigation is generally developed in phases. On the basis of the evaluation of the performance of the first phase, it is possible to modify the proposed irrigation system of later phases, such as alignment of distributaries, canal lining, reduction or enlargement of irrigated area on the basis of water available, cropping pattern, water charges, and operating and management practices (Biswas 1987).

Generally, for most engineering and technical aspects, technical inspection and supervision and cost-accounting systems are normally integrated within a project in some fashion. What may be necessary is to review the existing or proposed system to see if some further improvements can be made to make the system more efficient.

There are some areas at this level where monitoring is desirable or even essential but is seldom performed except in an anecdotal fashion. Among these are employment generation and beneficiary participation.

Even though employment generation during the construction phase is an

important benefit of any major irrigated agriculture project, and unemployment and underemployment are chronic problems in most developing countries, it is seldom monitored properly. If construction processes are specifically designed to use labor-intensive methods, employment generation can be maximized, and consequently, a large number of unskilled and landless laborers, including women, can benefit from them.

Beneficiary participation is another area that needs more attention. Very seldom do beneficiaries participate or are consulted on issues like canal alignment, which may be important in terms of equity distribution.

Operation and Maintenance of Irrigation and Drainage Facilities

Operation and maintenance (O & M) is one of the most underestimated aspects of irrigation projects in developing countries. Yet, if the benefits from irrigation projects are to occur on time and to the specific target groups, it is essential that O & M be carried out efficiently to ensure that the water supply is reliable, that farmers at the tail end receive their regular and fair share of water, and that the drainage system is functioning properly so that salinity and waterlogging problems do not occur. A review of past irrigation projects will indicate that most project agencies are generally not ready to undertake O & M work when the construction phase is completed. O & M still receives low priority, at least when judged by the actual performance, by both governments and donor agencies. Thus, not surprisingly, funds available for O & M are mostly inadequate or are not released on time. Often maintenance efforts continue to be postponed, until a major crisis appears and it can no longer be postponed. During this period of postponed maintenance, the efficiency of the project continues to decline, and during a crisis situation, the problem faced is generally more complex to resolve technically and more funds must be extended than if the maintenance work had been carried out on a regular basis.

Another issue worth noting is the fact that poor though O & M is for irrigation, it is generally even worse for drainage. Poor drainage contributes to salinity and waterlogging problems, but since such problems take some time to develop, the magnitude and extent of the problems may not be realized until they become serious.

Agricultural Production

The fundamental objective of any irrigation project is to provide efficient and reliable water control in order to increase agricultural yields. Efficient water control, referred to at the previous level, by itself is not the sufficient condition to maximize agricultural production, which simultaneously requires other essential inputs such as seeds, fertilizers, pesticides, machinery, energy, as well as extension, credit, and marketing facilities. It is equally important to ensure that irrigation water and the various inputs are available to the farmers on an integrated and timely basis. For monitoring and evaluation at this level, all these factors, with the exception of irrigation water which has already been considered in the previous level, need to be considered.

Information needs to be collected at critical times for each cropping season, which can then be used to provide better coordination between the different organizations responsible for the various inputs and services. At the end of a cropping season, an overall performance review of the season may

be necessary, which may assist in the preparation of an integrated, and more improved, plan for the subsequent cropping season.

In most irrigation projects, monitoring and evaluation of agricultural production may require more continuing and regular effort than any of the other three levels.

Achievement of Socioeconomic Objectives

The fundamental objective of any irrigation project is to increase agricultural production, which will not only increase availability of food for people, but also directly contribute to increased income generation of both farmers and non-farmers. Increased productivity and the consequent rise in farm income could go a long way to achieve the socioeconomic objectives of the project.

It is, therefore, essential to monitor the impacts of the project on the proposed beneficiaries. For example, it is quite possible that an irrigation project may enhance the employment and income potential of landless laborers due to intensified agricultural activities. Equally, it could replace overall employment potential by undue emphasis on mechanization, which could make the life of landless laborers far worse than at the pre-project level. Similarly, it may be possible that the income of small farmers and landless laborers increases significantly due to the project, thus making more equitable income distribution in the area. Alternatively, the benefits could accrue primarily to the large farmers at the cost of small ones, which would make income distribution even more skewed than before. Depending on specific irrigation projects, both alternatives have been observed in the past.

It is equally important to monitor the impact of increased income on some quality-of-life indicators. For example, is the increased income improving the quality of life of the people in the project area, e.g., better nutrition and literacy rate, improved housing and health services, provision of clean water and sanitation, etc., or is it being primarily used for conspicuous consumption, as has been observed in certain instances?

From a management viewpoint, it is desirable that monitoring and evaluation of the achievement of socioeconomic objectives be carried out on a regular basis in order that a good picture be made available on the status of the development. This will enable the managers to make appropriate policy modifications and interventions in time that will further maximize the benefits and simultaneously reverse undesirable trends. To this end, it is necessary to monitor both intended and unanticipated impacts.

It is not necessary to monitor the relevant socioeconomic factors at frequent intervals. Some factors like education, health services, or housing facilities can be monitored once every three to six years, depending on the situation and requirements.

Internal or External Evaluation

Basically there are two alternatives by which irrigation projects can be evaluated. These are internal, where a cell or unit is established within the project or the appropriate ministry, and external, where the work is contracted out to a private company, research institute, or a university. Both alternatives have their own benefits and costs, and the decision as to which alternative may work best is often project-specific.

There are many benefits as well as costs for carrying out internal evaluation. Among the benefits could be the following:

1. Staff members generally have a better knowledge and/or feel for what has really happened, the reasons as to why they happened, the actual constraints faced by the project management, and feasible alternative solutions that are implementable.
2. Evaluation can be handled less obtrusively since staff members of the evaluation unit may already have some rapport with the project staff, who may feel less threatened by such evaluations.
3. Internal evaluators are likely to get more involvement from the users of the information as compared to external professionals, who may have less commitment to the project.
4. It is likely to be less expensive than hiring high-priced external short-term consultants.
5. The results of internal evaluation are more likely to be used since the evaluators may have more intimate knowledge of what could motivate the system to change and adopt new ideas.

Among the problems encountered during internal evaluation could be the following:

1. Since no organization likes to have evaluations that reflect negatively on its programs and operations, internal evaluators may face significant pressure to downplay negative findings and emphasize positive results. Evaluators may feel threatened if they are to question the decisions taken by the senior management. Organizations can influence internal evaluators by promotion control or even through subtle threat to continued employment.
2. There are many cases in national and international organizations where there is a greater stress on making their evaluation units visible than on the quality or the use of the evaluation results. The evaluation unit becomes a symbolic representation of objectivity and quality of work of the organization. Such units thus serve a ritual function, which is more of a public relations exercise than a measure to improve the management process.
3. Internal evaluations may promote some vested interests.

Similarly external evaluations have their advantages and disadvantages. Among the advantages could be the following:

1. Evaluations can be more objective and emotionally detached.
2. They can provide new ideas, perspective, and knowledge.
3. They are likely to have more information on similar projects elsewhere and thus provide much-needed intercomparison.
4. If the external evaluating team contains people of stature and influence, the management is likely to pay more attention to the findings.

Among the disadvantages of external evaluations could be the following:

1. External evaluators are not likely to be familiar with the structure, procedures, and the working environment, which may make the evaluation process difficult, time-consuming, and expensive. In certain instances, this unfamiliarity

can even lead to wrong prognosis or conclusions.

2. External evaluators may be more threatening to program managers and thus they may withhold relevant information.

3. Like internal evaluators, external evaluators can also be pressured to down-play negative findings by threatening to withhold future contracts.

It is, however, possible to combine internal and external evaluations within an overall monitoring and evaluation framework. A judiciously combined internal and external evaluation process can be more cost-effective than internal or external evaluation alone. Concern for the utilization of the results should be the driving force of any evaluation, and accordingly the decision as to whether to use internal or external or some mixture of the two should be decided on the basis of which is likely to produce the most usable results.

CONCLUDING REMARKS

Monitoring and evaluation are integral components of any management of irrigation projects. However, this does not mean that if monitoring and evaluation are carried out, the efficiency of management of projects will automatically be improved. On the basis of a review of monitoring and evaluation activities of irrigated agriculture projects in Asia and North Africa, the general situation appears to be that monitoring and evaluation are having far less impact on the management process than expected or even possible.

One of the main reasons for this sad state of affairs is that monitoring and evaluation is being imposed from above by donor agencies, both multilateral and bilateral, on developing countries. A stipulated condition of any loan or grant by the World Bank, the International Fund for Agricultural Development, or similar funding agencies has been to establish monitoring and evaluation activities within a project. The monitoring and evaluation requirements of these external agencies are not uniform. The managers at the project level do not have a good understanding of the process. Under such unsatisfactory conditions, monitoring and evaluation gets done not because the national project managers feel that it is necessary, but essentially because it is a stipulated condition of the loan or grant. Accordingly, it is not surprising that monitoring and evaluation activities generally lack a sharp focus and the processes are seldom constructively reviewed either by national or international agencies. Monitoring and evaluation in many projects have become routine and perfunctory affairs that are done mainly because of administrative requirements, wherein activities and impacts are routinely monitored and documented, reports are neatly filed, but the project activities continue merrily on their way, unaffected in any sense and with a business-as-usual attitude.

For any evaluation to be used, it must be credible, which means the users must perceive it to be objective, accurate, and fair. This means the evaluators must establish a basis of mutual trust before the results are delivered to the potential clients. Furthermore, evaluation should be fair to all groups that may have a stake in the results. Evaluation reports should be clear, unambiguous, balanced in terms of strengths and weaknesses, and contain justifiable conclusions and recommendations based on adequate and reliable data sources. Fuzzy and amorphous recommendations are likely to ensure that the results will not be used.

For monitoring and evaluation to succeed, we need a new ethos. As Brown (1976) has aptly noted, the heart of evaluation is an attitude, a frame of mind that enables us to review the project activities and performance in a constructively critical light. This should be done with emotional detachment. Managers need to develop a new evaluative mindset that allows them to appraise the performance, reflect on what has been learned for future activities, and then adjust policies, if necessary, in response to what has been learned. Without such an ethos, it is unlikely that benefits of monitoring and evaluation can be fully harnessed.

APPENDIX. REFERENCES

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