INTRODUCTION

One of the world’s great challenges is to increase food production in a sustainable manner so that a rapidly growing global population can be fed. The world’s growing population and production, combined with unsustainable consumption patterns, is putting increasing stress on land, water and other essential resources. Efficient use of limited land and water resources can only be achieved by development, monitoring and evaluation of those resources. Irrigated agriculture is playing a major role in reaching the broader development objectives of achieving food security, and improvements in the quality of life in developing world. In Turkey, it is estimated that the area of 8.5 million hectare can be irrigable considering technical and economical conditions. In recent years, approximately 4.5 million hectare were irrigated out of an estimated total area of 8.5 million hectare considered suitable for irrigation. Irrigation development is carried out by the private sector (farmers and group of farmers) and the public sector (State Hydraulic Works and General Directorate of Rural Services). Despite large financial resources are being directed to irrigation development, the overall performance of many irrigation projects is much less than expected even in long-term. The situation also contribute to serious environmental, social and health problems.

Main reason for poor performance of irrigation projects is lack of efficient irrigation management rather than technical deficiencies in project planning, design and construction. Therefore, irrigation experts, project managers, national planners, and decision makers are discussing on whether establishment of new irrigation projects or rehabilitation of existing ones with efficient irrigation management.

As about two-thirds of the world’s fresh water supply is used for irrigation, it uses as much as 90% of available water in many developing countries such as Turkey (Postel, 1993). While the renewable amount of water available is fairly fixed, the amount of water available per person and per year diminishes as population increases. When considering global trend on potential water demand per person in the world and in Turkey in the year of 2025-2050, increasing water shortage will be inevitable. It is projected that by the year 2000 the share of

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other water uses will increase and that of irrigation will decrease. This confirms that the competence and conflicts between various water demands are currently a major problem. It implies that more land must be irrigated with less water and more production must be achieved to meet the demands.

**MONITORING AND EVALUATION (M&E)**

Project monitoring and evaluation are management tools that came into picture in the 1970s (Golaszinski et al. 1992). They were established to improve management of project implementation. Their functions are very closely related to one another and more frequently they are used as interchangeable synonymous (Anonymous, 1989). Actually, it is not possible to deal with one of them without having interaction with the other. For example, monitoring activities without making evaluation of the results does not make much sense. On the other hand, it is not possible to conduct evaluation without data from monitoring activities.

However, although their functions have very close similarities, monitoring and evaluation will remain as two distinct management tools that complement one another, but differ in their contents, role, audience and timing (Anonymous, 1978; Casley and Kumar, 1987). Monitoring activities are carried out during project implementation and its primary purpose is to aid project management of the implementation activities. In contrast, project evaluation begins with the initial statement of the project objectives, through the project implementation and continues until a few years later after the project has been completed.

Because of the similarities between the functions of monitoring and that of evaluation, there is a danger of confusing the areas of responsibility between staff involved with monitoring and those involved with evaluation. Casley and Lury (1984) are of the opinion that monitoring will not be successful unless it is distinguished from evaluation. Only then will it play its proper role as a management tool within the project's management functions. In this connection, the two subjects, monitoring and evaluation, will be handled separately in the following sections.

**Project Monitoring**

Project monitoring is an integral part of the day-to-day project management. It is involved with a systematic and regular data collection, data processing, data analysis and reporting of the results to project management during the time of the project implementation (Casley and Kumar, 1987). The project management interprets the results of the reports to trigger the necessary action in response to the findings.
As such, project monitoring is primarily an internal project activity based on the PPM. It is basically carried out by project staff who may be organized under a special monitoring unit, or who may be organized within the set-up of the individual sections in the project (Anonymous, 1989).

The objective of the project monitoring is to compare actual project performance against set targets to detect any departure from the planned course of action. It is used to indicate whether the inputs are being delivered in the right quantities and at the right time; the activities are being implemented as planned, on schedule and within the budget limits; and the output targets are being achieved. Project monitoring is also used to indicate factors causing implementation delays or unexpected results. Feedbacks from the findings are channelled to the project management to take the necessary action. This may lead the management to intervene in the implementation activities or to modify the original implementation plan (Anonymous, 1989; Anonymous, 1991; Casley and Kumar, 1987; Golaszinski et al. 1992).

Project monitoring focuses more on the input and output situation because these are the areas for which the project management can be held responsible for any success or failure of the project. The role of project monitoring diminishes as the hierarchy of project objectives and the importance of impact evaluation increases.

**Project Evaluation**

Project evaluation is used to conduct a systematic and comprehensive assessment of the relevance, performance and impact of the project in the context of its stated objectives (Anonymous, 1991). That means, it reviews the relevance of the project to solve the identified problems, it makes assessment of the project plan and the ability of the project management team to implement the project plan and the ability of the project management team to implement the project effectively and it determines the impact of the project on the target groups and environment.

Project evaluation makes analysis of the project inputs, activities and results and judges these against explicitly stated norms (Anonymous, 1978). The results are used to adjust the planning or implementation strategy to ensure the required project results (Casley and Kumar, 1987; Golaszinski et al. 1992).

Project evaluation is an activity that required broader information-sets than project monitoring. However, most of the information required to conduct evaluation, to explain the trends for the effects and impact of the project is drawn from the database created during monitoring activities (Casley and Lury, 1984). The monitoring database is usually...
supplemented by data from other sources, such as, ad hoc surveys, case studies, etc. depending on the type of evaluation being conducted.

The objective of the project evaluation is to draw lessons from experiences about the project and convey these lessons to concerned parties: to management at project level, donor institutions and to host government (regional or sectoral development planners). These parties may use the knowledge to adjust their intervention strategy to the ongoing project or may use the experience gained to improve future planning and implementation of similar projects elsewhere.

In contrast to project monitoring with its main focus on inputs and activities, the focus of project evaluation is primarily on the implementation performance, project outputs, project effects and project impacts (intentional and unintentional long-term effects). Project evaluation is conducted during different phases of the project life cycle to serve different purposes. In relation to the purpose, project evaluation can be differentiated in ex-ante evaluation, on-going evaluation, mid-term evaluation, terminal evaluation and ex-post evaluation.

**Monitoring and Evaluation of Irrigation Projects**

Although the area under irrigation has increased steadily, production benefits have been below expectations. Disappointing results have encouraged the discussions on irrigation management. It is agreed that inefficient irrigation management has contributed to less income than expected, and also many socio-economic, environmental and health problems (Biswas 1990 and Rieser 1989). According to Huppert (1993); all the problems arise from inadequate operation and maintenance of irrigation projects. The problem is much more acute in developing countries. Svendsen (1989) has stated that the irrigation-related problems have resulted from inefficient irrigation system management in operational phase and lack of efficient monitoring and evaluation system in management. Sustainable water resources development require the setting up of new strategies consisting in close monitoring and evaluation of irrigation system performance and water management at the field level, improvements in irrigation and on-farm structures.

Various stakeholders and institutions such as farmers, donor institutions, local managers, agricultural agencies are playing efficient role in defining the scope of monitoring and evaluation of irrigation projects (Rieser 1989). The scope and impact area of any irrigation project was divided into nine sections by Ohlmeyer (1993) as it is given in Figure 1.
Figure 1. The Scope and Impact Area of an Irrigation Project
According to Doppler (1985); irrigation has four main components: economics, natural sciences, management and socio-cultural conditions. The presence of many different approaches naturally raise difficulties in establishing monitoring and evaluation system.

Information system for monitoring and evaluation of irrigation project in operational phase is divided into five sections (Juriens 1993; Biswas 1990; Brügger 1995; Rieser 1989 and Beyribey et al. 1995):

* Monitoring and evaluation of natural resources,
* Monitoring and evaluation of water use efficiency,
* Monitoring and evaluation of agricultural production,
* Monitoring and evaluation of environmental problems,
* Monitoring and evaluation of socio-economical condition

STAKEHOLDERS

To be effective, monitoring and evaluation should be both participatory and strategic. M&E is participatory when it includes all stakeholders in the process and is strategic when it deals with fundamental issues. A successful outcome will normally depend on forging consensus among a diverse set of stakeholders. Participation can be in many forms but always validate and mobilizes support for the process.

According to Vermillion (1999); stakeholders in irrigation sector should include owners and cultivators of irrigated land, irrigation department staff, tax payers, policy makers and planners in the water and agriculture sector, technical assistance experts, agriculture crop processors, merchants and consumers. They may also include other people who desire access to water from the irrigation system for non-irrigation purposes (such as household uses, livestock, industry, power and so on), other water users at the basin level, agricultural cooperatives, labour unions, NGOs and environmental interest groups.

On the other hand, Anonymous (1983) classified stakeholders in M&E of irrigation projects as national planning and finance agencies, ministry of agriculture and regional authorities, project coordinator, regional project manager, district staff, field staff, and farmers. The counterparts of this hierarchical order in Turkey; State Planning Office (SPO) and Ministry of Finance, Ministry of Agriculture and Rural Affairs (MARA), State Hydraulic Works (DSI), General Directorate of Rural Services (GDRS), District Directories of GDRS and DSI, Irrigation Departments of District Directories, field staff of related departments and farmers.
INFORMATION REQUIREMENTS OF STAKEHOLDERS

It should be noted that there is a strict interdependence between improved irrigation management, administrative regulation and information requirements. A monitoring and evaluation system depends on information requirements of project management about project type and management functions (Salzer 1989). Since information requirements for project management are based upon project phases and management groups (managers of farmer groups, national agencies and institutions) in various levels, it shows differences in terms of time and conditions (Rieser 1989).

Monitoring and evaluation consists of data collection and data analysis. The main objective is to lessen information requirements fairly and to select useful indicators. It is first needed to analyse management functions from farmers in all level to national planners and to determine the measures related to project. Related institutions or personnel in all level require information for its related topics, M&E unit requires information for daily activities in project level. On the other hand responsible agency and ministry requires information about project results and impacts for better project planning and control in the future. Management groups and their information requirements in a project was shown on a pyramid in Figure 2 (Anonymous, 1983).

If determination of information requirement takes long time, M&E unit with other management sub-units responses the important questions comprehensively. Important questions for determination of information requirements were summarized as follows (Lang, 1987):

* Who needs information and which information is necessary?
* For what purpose information will be used?
* When and in which time interval information is needed?
* In which quality and quantity information is needed as minimum?
* In which way information is transferred to related person or institutions?

Almost all institutions deliver reports monthly, annually and sometimes twice in a year concerning their activities. Performed activities are announced to the related person and institutions by means of regular reports. If project management is newly established, it requires standard form of report. Casley ve Kumar (1987) suggest that pre-planning studies prepared by experts who are not involved in project should not be used in determination of information requirements as a main source. For that reason, it is needed to establish an
information requirement plan at project level in which farmers are included. Additionally, anticipated and unanticipated project impacts should be taken into consideration in determining information requirements.

Figure 2. Related Individuals and Units and Their Information Requirements

RESULTS AND RECOMMENDATIONS

It has been clear that the irrigated agriculture system are unique and dynamic. In order to increase the efficiency as well as the performance of the system, users’ participation in the management is a must. Since their decisions and ideas have a great impact on the operators and the managers of the system, users’ involvement at all stages of M&E process of systems would assure the sustainability of the system.
Various stakeholders and institutions such as farmers, donor institutions, local managers, agricultural agencies, decision makers are playing efficient role in irrigation development. However, there is no framework to provide strong coordination among stakeholders and institutions in Turkey. Efficient use of irrigation investments depends largely on strengthened organizational framework, education and training of farmers and their experiences in irrigated agriculture. Therefore, a national institution must be established as soon as possible with the responsibility of research, planning, design, construction, operation, training and extension in irrigated agriculture. Newly established institution must be organized in such a manner that it should undertake whole responsibility on irrigation-related topics as former TOPRAKSU (The Soil Conservation and Irrigation Organization) did. This institution may involve in wide range of activities such as training of farmers, extension services, land reform, land consolidation, land leveling, irrigation and drainage, reclamation of saline and alkali soils, and agricultural economics studies. Unique aim in developed projects must be efficient water use for the benefit of human and environment. In this regard, new strategies using available natural resources rationally should be introduced and projects which address environmental protection should be developed in realizing the objectives. It should be kept in mind that in the phase of planning, construction, control and rehabilitation of irrigation projects, all projects must:

- be respectful to human being
- include participatory management
- provide continuous and full satisfaction of stakeholders
- not contribute to environmental degradation
- be accurately applied at the right time
- contain continuous training and education services

New projects should attempt to establish a new role for the managers involved in irrigation development that there the need is for understanding of complex management responsibility, rather than merely looking for technical solutions to the problems. It would only be possible with irrigation staff who are skillful in exact definition of the problems. It will ultimately contribute to the solution of the problems in irrigation development.

REFERENCES


