Staff Papers Series

STAFF PAPER P86-27 JULY 1986

MONITORING AND EVALUATION FOR INTEGRATED RIVER BASIN DEVELOPMENT AND WATERSHED MANAGEMENT

K. William Easter

Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

Staff Paper P86-27

July 1986

MONITORING AND EVALUATION FOR INTEGRATED RIVER BASIN DEVELOPMENT AND WATERSHED MANAGEMENT

by

K. William Easter

Professor
Department of Agricultural and Applied Economics
University of Minnesota

Presented at workshop on Integrated River Basin Development and Watershed Management sponsored by Ministry of Public Works, Republic of Indonesia with assistance of the Environment and Policy Institute, East-West Center, Honolulu, Hawaii, March 22-27, 1986, Jakarta, Indonesia and revised June 1986.

ABSTRACT

If the monitoring and evaluation systems (M/E) are to be effective, project and program managers must be willing to and actually invite bad news. These systems must be designed to help managers improve project implementation. Thus news about inadequate performance must reach decision-makers who can make changes. Timely information for decisionmaking is what M/E must provide. In the case of water resource programs socioeconomic as well as environmental measures of impacts must be included.

To establish effective M/E systems requires realistic targets and objectives that are not tied to unrealistic planning documents. Potential beneficiaries must be included in the M/E studies either through surveys, panels or informal meetings in the watershed. Beneficiaries are an important source of information both in terms of local conditions and performance. Who should understand program impacts better than those it is suppose to benefit?

Evaluation must be done at the watershed and river basin level so that impacts which are external to the project are measured. Conflicts can often arise when two different agencies or programs are trying to develop water resources in the same river basin. Only an evaluation with a broad river basin prospective can highlight these potential conflicts. These studies should be designed to show decision makers how resource management changes in one part of the watershed or river basin will affect other parts. Very seldom do management decisions only influence one small area.

Monitoring and Evaluation for Integrated River Basin Development and Watershed Management

by K. William Easter

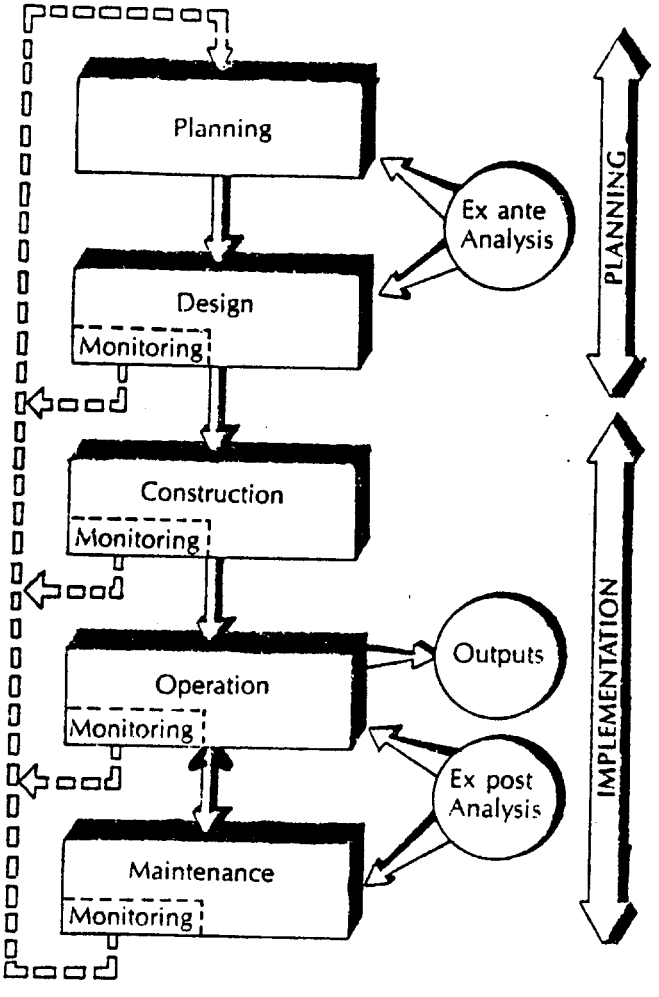
One of the keys to effective program or project implementation is information. However, as Robert Chambers points out relevant, after a review of development projects, accurate and usable information is seldom available to decision makers when they need it.

> "Decision makers need information that is relevant, timely, accurate, and usable. In rural development, a great deal of the information that is generated is, in various combinations, irrelevant, late, wrong, or unusable anyway. It is also often costly to obtain, process, analyze, and digest. Although many professional social scientists have given thought to improving information gathering, it remains a remarkably inefficient activity. Criteria of cost-effectiveness have not often been applied, and manifest inefficiency is sometimes met by demanding not better information, or less, but simply more" [Chambers, 1985, p. 399].

Yet information is one of the key outputs of any effective monitoring and evaluation (M/E) system. So essentially Chambers is arguing that our M/E systems have been defective. Thus this paper focuses on some of the basic ingredients of an effective M/E system and the problems involved in using such a system. The implication is that the marginal value of the information produced by such a system is much larger than the marginal costs of providing it.

Monitoring and Evaluation (M/E)

As shown in figures 1 and 2 monitoring starts at the design stage and continues while the project is operating. Evaluation starts at the planning stage with *ex ante* analysis including baseline studies and may even continue after the project is defunct with *ex post* analysis. For



Source: Adapted from Bower and Hufschmidt (1984)

FIGURE 1. The Five Stages of Watershed Management Process

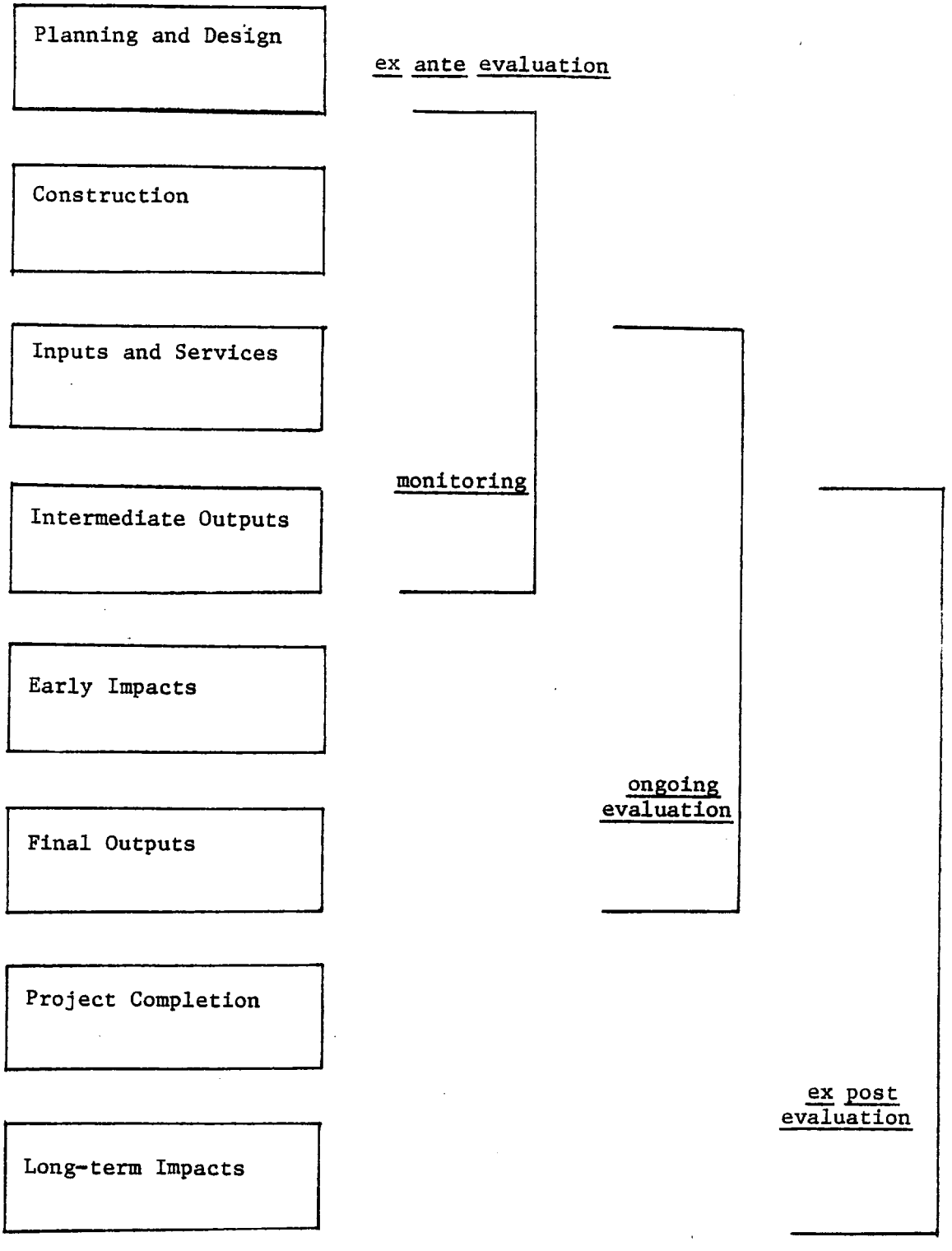


FIGURE 2. Major Elements of a Monitoring and Evaluation System

Adapted from Hyman, 1985

example, it may take 30 or more years of operation before ex post analysis can show whether or not a flood control project really achieves its objectives.

Monitoring is a continuous process that should be designed to tell project or program managers what has or is happening. While a project is being implemented there should be a feedback of information concerning performance (figure 1). Monitoring should be a key source of information for managers. If it is not then monitoring is faulty. Thus managers must have a major input into the design and operation of monitoring systems. They should indicate the types of information they need and when they need it.

In contrast, evaluation involves analysis of what has happened, to determine program or project effectiveness. This involves analysis to see how well a project is fulfilling objectives and even ex post analysis to see if ex ante rates of return have been reached. Evaluation can be either ongoing or periodic. The former would tend to be most valuable to project managers who want to know if the project operation needs to be changed. The periodic evaluation can also help project managers but it is generally focused on the effectiveness of project design. Thus planners can determine what mistakes have been made in project design so that they are not repeated in future projects. Not surprisingly planners do not generally encourage detailed ex post analysis of their projects. Even in the U.S. the Office of Management and Budget (OMB) does very little ex post project evaluation.

Effective monitoring and evaluation systems are likely to provide managers and planners with bad news. In other words, during project implementation problems generally arise that will require changes in

design and operations. For example, the major management action of the Highland Agricultural and Social Development Project in north Thailand was to establish Arabica coffee as a cash crop. However, during implementation two serious flaws were found in the original plan. First coffee was found to be inappropriate for a large part of the area and second the incentives were inadequate to achieve farmer participation [Hoare, 1984]. This is the type of information that a M/E system should provide designers and managers as soon as possible. Since the M/E system was not as effective as it should have been and design changes generally occur slowly, there was a lengthy delay before the program deficiencies were corrected and other tree and field crops replaced coffee.

Managers and planners must expect and even seek bad news. Plans cannot be perfect and program implementation must be flexible enough to adjust to actual conditions found in local areas. Thus managers must identify potential problems and be able to make the needed changes. For example, when the evaluation of an irrigation system in Andra Pradesh, India found it to be in poor condition, the Command Area Development Authority (CADA) got prompt action.

> "The distributary was in disrepair. There were twenty-one open cuts and a lot of weed growth. Illegal cross-binding by top-end farmers was a common feature. There were no controlling devices in any of the offtakes. All drop structures were damaged. There were two unauthroized outlets. The shape of the distributary was so badly eroded that its bed width varied from 8 ft. to 12 ft. as against the designed width of 5 ft. Water was supplied only to 100-200 ac. 'blocks', below which there were no field channels.
>
> At CADA's request the Irrigation Department's Executive Engineer took prompt action and all necessary repairs and improvements were carried out. All the open cuts were closed. All the sluices serving non-rice lands* were fixed in concrete. The sluice openings were remodelled wherever necessary. Minor canals which had not been excavated or had silted up were re-excavated. Field channels were provided up to each survey number (c. 10 ac.). As this was an old project for which neither CADA nor the Executive Engineer had any funds, the District Collector (Administrator) had

*my clarification

> to sanction Rs. 63,000 (US$7280) from the drought relief funds for improving this distributary and one other " [Ali, 1983, p. 5].

This is how we would want managers to react to bad news from M/E. In contrast the Chief Engineer of the Nargarjunasager project ignored the bad news and claimed that the project was achieving a high level of efficiency.

> "Despite the low proportion of the command area actually irrigated, the Chief Engineer of the project claimed in a written report to a water management workshop in 1978-79 that utilization was 90%. However, when the Rotation Water Supply Programme was to be introduced in two minors in the same year, it was not possible to find two minors capable of carrying the designed discharge to every outlet " [Ali, 1983, p. 11].

Thus a M/E system can only be effective if the managers and planners are willing to listen and take action when inadequate performance is reported.

Components of Effective Monitoring and Evaluation

Baseline studies. Carefully designed baseline studies form an important cornerstone of any M/E system. Without knowing what conditions were without the project it is difficult to judge progress and program effectiveness. This information is also essential in planning and implementation.

Baseline studies should use secondary sources of information when it is available. For example, do soil maps exist or are there aerial photographs available for the watershed and river basin. Other surveys or studies may also have been conducted in the area which can be used to supplement baseline studies and reduce the need for new data collection.

A good example of what not to do occurred in northeast Thailand on a watershed project near Khon Kaen. A socioeconomic baseline survey was conducted during the project's pre-planning stage which was suppose to provide information for use in the project design and implementation stages.

However, during a visit to the site in 1984, the project staff complained that the survey results were still in Bangkok and were not available to them even though the project was over half completed. Serious problems concerning community participation in the project were, at least, partly caused by the managers' poor understanding of the basic social structure in the watershed community. Had the survey information been available at the appropriate time the project would have had a better chance of being successfully designed and implemented. In contrast, the project ended up building a few ponds for individual farmers because "the farmers would not cooperate." However, after visiting with villagers we found that they once had village ponds which were community operated. With an appropriate understanding of the potential for collective action the project could have rehabilitated these old ponds and fostered collective activity.

Management support. One of the interesting contradictions in M/E is the lack of support from project management who are suppose to need information on project performance. There are, at least three general weaknesses in M/E that contribute to this contradiction. First the information provided, many times, is not useful to the project or program managers. Second the information is not accurate and/or timely. Finally the M/E results are sometimes used to criticize program managers rather than to help them improve their management decisions.

The first problem can be dealt with by having managers and project staff help define what information is needed and when they need it. Providing adequate funds and staff will help eliminate the second weakness. Continuity in staff as well as staff training will also help improve M/E results. In addition, those doing M/E should be given a high status so that the best

people are attracted. The OMB staff of the U.S. President is a good example of this principle.

The last weakness is the most difficult to deal with. It means that M/E staff must be objective and fair in their analysis. Monitoring must be focused on helping managers quickly improve decisions and project implementation so that problems do not become debilitating. However, if a project is a failure M/E staff must be willing to call it a failure so that it can be terminated and the staff and funds transferred to more productive enterprises. This, of course, is a very unpopular task particularly if it means large transfers which is another reason to give M/E staff special status. The M/E staff must have some protection if they are to make unpopular decisions.

A closely related problem concerns management training. Many project managers, who have excellent technical training, do not understand modern decision making techniques. Thus they have a difficult time comprehending the role of M/E. They do not know what information to request let alone how to use it. Improved management training is the most direct way to deal with this problem. With the many excellent management schools throughout Asia, it should not be an insurmountable problem. Still it will require government resources and a commitment by those who are to be trained.

Realistic targets. Targets for inputs, activities and outputs can be an important part of effective monitoring. Yet targets established during planning can be unrealistic and must be flexible enough to change as the project changes. In fact, planned targets may become totally inappropriate if economic or technical conditions change during implementation. Targets may also be unrealistic because the original plan was unrealistic. Many plans include inflated estimates of project benefits so that the project will pass the economic efficiency test. If

physical performance targets are taken directly from the plan, the implementing agency may find they are impossible to reach.

A good example of adhering to unrealistic targets occurred in a watershed in north Thailand south of Chieng Mai. The implementing agency had planned to build a large number of small ponds within the watershed to provide water for domestic and livestock use and for irrigation in the dry season. However, during program implementation it became clear that there were only about half as many good sites for ponds as originally planned. This did not deter the agency from continuing to build ponds in any depression available in the watershed. The end result was that the number of tanks constructed was fairly close to the physical targets. But only a few tanks were used and many were expensive to construct because of their poor physical location. Thus funds were wasted in an attempt to meet unrealistic physical targets while the benefits to watershed residents and downstream farmers from the additional tanks were minimal.

Building flexibility into the original plan can help prevent unrealistic targets. Glavez argues that flexibility is an important aspect of the reforestation efforts in the upper watershed of the Philippines.

> "Project implementation must be provided with a variety of alternative species and the flexibility of changing the combinations must be left open... A fixed plan on the hectarage of a given species will only magnify the difficult task of implementing a reforestation project... Area estimates for a given plantation purpose should be established at the planning stage of the project to provide reasonably accurate estimates of costs and benefits. This should not, however, tie the hands of the implementers when some of the species later on are found to be unsuitable or display unsatisfactory performances in the field" [1984, pp. 27-28].

Thus realistic targets should be flexible and not based on a few easy-to-measure physical accomplishments such as acres of terraces or numbers of trees planted. Still physical targets can provide one set of information

for program monitoring. However, a complete set of targets would include measures of both socioeconomic and environmental conditions within the watershed and river basin.

Finally overemphasis in evaluation on achieving targets, particularly physical targets can divert emphasis away from measuring impacts. This can be a serious problem in watershed and river basin projects since there can be a long time lag between the application of practices and their impacts. For example, changes in soil erosion may not affect stream sediment loads for many years due to sediment accumulation from past erosion. In addition, since impacts may be unintended and/or quite dispersed, measurement will not be easy. Thus, the M/E staff can be easily diverted to the much simpler task of counting physical targets rather than trying to construct measures of changes in environmental or socioeconomic conditions [Hyman, 1985].

Participatory approach. A key weakness in the north Thailand watershed project was lack of local participation. The villagers in the watershed were never asked if they wanted ponds or where they wanted them built. Thus it is not surprising that few of the ponds were used.

Participation is also important in M/E. As already pointed out, managers must participate in decisions concerning the information needs for monitoring. Equally important is to have the beneficiaries participate especially in evaluations. For example, the farmers at the end of the canals in an irrigation system must be involved in M/E. And who should be in a better position to judge performance than the proposed beneficiaries. They should not only be a source of questions but also a source of local information which can be valuable in project design and implementation. For example, the Ministry of Public Works in Indonesia was constructing an irriga-

tion canal which local leaders said should be routed elsewhere because the soil was unstable. The engineers went ahead and completed the canal in the planned location. But within six months the canal had been breached and had to be rerouted just as villagers had suggested.

This type of information must be collected and used by the M/E staff. Villagers can provide information concerning physical conditions as well as what cropping changes and practices would be acceptable to local people. There is a growing body of evidence from irrigation and other development studies which indicates that the participatory approach is very important in obtaining information and encouraging local action [Chambers, 1985; Uphoff, 1985; Coward, 1986]. And as pointed out above, providing information is what M/E is all about.

The participatory approach should include all groups of potential beneficiaries particularly the poor and more isolated groups. These groups will be the most difficult to reach but they may provide the most valuable information. This will be particularly important for upper watersheds as pointed out by Dani [1986]. "Since it is the watershed community which lives closest to the watershed's resource base, they should have a more active role in maintaining those resources, not only for themselves but for the nation .... However, the watershed community will not fulfill this obligation unless their needs and priorities are taken into account."

One might even establish a panel of families representing all groups in a watershed. They would be understood in depth and revisited at intervals to learn about changes and general watershed conditions. This would give the M/E staff an indepth understanding of how a project was affecting the watershed community.

A key rule to remember when collecting information from villagers is that they should be considered teachers. The investigators should consider themselves as their pupils [Chambers, 1985]. By doing this the investigators will not only collect the data they are after but they can also obtain other important information about the watershed community and the project.

Measures of effectiveness. As pointed out above, physical targets can be misleading measures of effectiveness. Additional measures must be included that indicate the socioeconomic well being of the river basin and watershed populations. Such measures might include the real wages of agricultural labor, in and out migration, nutritional levels of all family members, the quality of housing, input levels and family income. The emphasis should be on measures of the general welfare within the river basin, with special concern for the lower income groups which will be found in isolated areas throughout upper watersheds. To reach these groups may require special visits by M/E staff to remote areas.

There have been some important improvements in techniques for measuring environmental quality benefits. In the past many environmental benefits have been dismissed as being too remote or abstract to measure. Yet by using surrogate markets and survey techniques we are now able to place monetary values on a number of important environmental quality benefits such as reduced water pollution and soil erosion [Hufschmidt et al, 1983]. This allows us to include monetary values for environmental quality changes as measures of project effectiveness instead of physical measures such as inches of soil lost. Using monetary values allows one to show that inches of soil eroded are not the same. Soil lost in one area of a watershed may impose a much greater impact on the environment

than similar amounts lost elsewhere. This is one reason why efforts to reduce soil erosion are much more effective if they are targeted on critical areas.[1/]

Household unit. To improve the evaluation and monitoring of socio-economic impacts of river basin development and watershed management the household unit should become the micro focus of analysis. One must be concerned about what happens to the household income as well as time available to perform various household and farming tasks. For example, the development of a new clean water source in the watershed could reduce the time required to collect domestic water. Although this may not directly increase family income it will have a very positive impact on family welfare. The time required to collect water will be reduced and the time saved can be used for other productive activities such as growing a garden or going to school.

By using the household as the unit of analysis both women and children are explicitly included. This contrasts with an emphasis on the farm unit where many of the important tasks of the women and children such as collecting firewood and herding cattle are excluded. Benefits from reducing family labor required to collect water or herd cattle to water can be as high as $10,000 to $20,000 for a small village reservoir project [Tubpun, 1986].

[1/] Critical areas are defined in terms of potential losses in soil productivity, potential downstream damages and soil erodibility. If the land is privately cultivated then the private incentives for reducing soil erosion must also be included in the definition.

Timing and accuracy. Again, project managers must have an important input into the timing and frequency of M/E. Information generated by M/E must be available when it is needed for decisions. If a study is conducted to determine the effectiveness of structures for erosion control, the study should be completed before the manager must decide on which practices to install. Of course, it is not possible to have all the information needed for every decision. Gathering and analyzing data costs money.

There is a trade-off between timeliness and accuracy of M/E. Many times the data collected has a degree of accuracy which is unnecessary and in doing so, something is usually lost in timeliness. Since decision makers have not had as much to say about M/E as they should, accuracy has been given a higher weight than timeliness. In M/E it should be made clear that if the information is late it is of little value. The decision maker is willing to give up some accuracy to receive the information on time. "Order of magnitude and direction of change are often all that will be used" [Chambers, 1985, p. 404]. This is particularly true in project monitoring.

For periodic and ex post evaluations focused on improving project designs or suggesting areas for rehabilitation, accuracy can be given a higher weight. Whether the study is completed in six or nine months it can still provide valuable information for new project designs or rehabilitation. A major concern in the evaluation should be whether the project will have the desired social impacts and a high rate of return. Yet the study will be of little value if it takes two or three years to complete while the rehabilitation decision has to be made at the end of one year.

Information collection methodologies. A range of methods for collecting information are available. For monitoring administrative records, field

staff reports and rapid appraisals including group interviews and site visits are some of the most useful sources of information. More can be done to make use of rapid appraisal methods for monitoring and ongoing evaluations. Chambers [1985] argues that rapid appraisal can be a much more cost-effective source of information than many other techniques.

> "Much good rapid rural appraisal (RRA) is little more than organized commonsense, freed from the chains of inappropriate professionalism and informed by continuous doubt and self-criticism. It has perhaps more to gain from the approaches of developmental social anthropology than from any other discipline. In its choice of method, it has to be eclectic, versatile and inventive. Because it can so often be more cost-effective than either uncritical rural development tourism or the long approaches of traditional research, it deserves to be accorded more attention, more prestige, and more coverage in professional writing" [p. 410-411]....
>
> "The dangers of RRA are as serious as its potential is large. Some superficiality and error are inevitable. The key to successful RRA is not to avoid superficiality and error completely, but to control them and achieve cost-effectiveness through optimal ignorance and appropriate imprecision.
>
> The most critical factors are time and the personal commitment of appraisers. RRA, by its sparing demands for information, should release time for more contact with and learning from the poorer rural people" [Chambers, 1985, p. 411] (those in the upper watersheds).

For periodic studies and ex post analysis, data collected in rapid appraisals and other monitoring studies can be very useful information. In addition, project or program cost records should be well documented so that they can be easily interpreted and used in ex post analyses. Periodic evaluations will involve detailed analysis using more traditional socio-economic surveys. If a panel of villagers has been used in the project monitoring, this will be an important source of information for these studies.

Communication of results. A key step in M/E, that may be neglected, is an effective communication of results to decision makers and planners. As researchers we spend a lot of time writing up research reports but do not spend enough time communicating the results to decision makers. This can also happen in M/E organizations. Decision makers need concise reports that make clear the strong and weak points associated with a project or program. Reports should make clear what decisions are required and provide a complete list of options even those that the agency might not be able to provide. For example, changes in the law that improve land tenure arrangements.

The reports should give the decision makers (managers) some sense of the certainty of possible outcomes. Sensitive analysis can play a very important role in providing this information. Prices, yields, project life and discount rates should all be varied in the analysis to indicate under what assumptions the project or program benefits will exceed real resource costs.

Informal meetings with program managers can also be an important way of communicating the full meaning of studies and analysis. The M/E staff should be able to tell managers "what they could not say in the reports." Managers must encourage staff to tell them what the problems are i.e. the bad news. Small informal meetings between managers and M/E staff is one key step in facilitating communication and feedback. The M/E staff obtains a better idea of the information needs of management while management gets a clearer understanding of how they can use M/E to improve decisions.

The Level of Evaluation

In integrated river basin development and watershed management, evaluation will have to be done at three different levels; the project,

watershed and river basin levels. Timely M/E should be done by M/E staff for particular projects and their specific components. This is already being done in a number of projects although there has been too much emphasis on achieving physical targets.

In contrast M/E is usually absent at the watershed and river basin levels. This is a critical gap in resource management activities since many externalities which are apparent at the watershed or river basin levels, are ignored at the project level [Dixon and Easter, 1986].

Two examples come to mind. First in the U.S. the failure to evaluate projects across agencies in a river basin led to a large empty reservoir. One U.S. federal agency planned and constructed a large multipurpose reservoir in the southwestern U.S. which refused to fill up according to plan. After an upstream reconnaissance it was discovered that another U.S. federal agency had been building a number of small reservoirs upstream. These reservoirs stored enough water so that the downstream project did not receive adequate water. The two federal agencies finally reached an agreement so that enough water was released from the upper reservoirs to fill the large downstream reservoir.

Had there been an effective evaluation done at the river basin level this inconsistency would have been identified and the problem avoided. Clearly too many reservoirs were built given the normal water supply. Thus effective M/E by an overall river basin agency could have saved the U.S. tax payers money.

The second example comes from south India where the problem occurred in reverse. In 1975-76 the large Pilavakal Dam was constructed to collect run-off from the mountain catchments which originally fed 37 small reservoirs

(tanks) in the watershed. The dam was built upstream of the tanks. During the planning and construction period, irrigation officials assured farmers that their tanks would receive additional water. But due to inadequate watershed planning the irrigation officials did not provide a channel to deliver water to the tanks. They also disrupted previous flows of water to certain tanks. This resulted in a number of tanks receiving less water than they had before the dam was built. In contrast, the tanks near the large dam received enough water to irrigate two crops of rice in most years.

Had the irrigation officials made a complete assessment of the watershed including a socioeconomic survey, they would have realized that their reservoir plan would not work. A connecting channel was absolutely necessary along with a set of rules for allocating water among tanks. However, to do a complete assessment the irrigation department would have had to measure past water supplies and uses in each tank and establish water rights. This they were either unwilling or unable to do.

These interconnections among water projects highlight the importance of a watershed or river basin M/E staff which can do evaluation studies of projects and their impacts within a watershed context. If such evaluations are not done externalities and unintended effects will continue to plague water resource projects [Dixon and Easter, 1986].

Monitoring and evaluation organization. If M/E is to be conducted at all three levels more than one M/E staff will be necessary. For project or program monitoring the M/E staff should work directly with the implementing agency. They need to collect information and report project performance to those in charge of project implementation. Evaluation studies particularly those done at the watershed and river basin level

need to be conducted by an external organization unless the implementing agency has responsibility for all activities in the watershed or river basin. Any serious effort to integrate watershed management and river basin development will require a M/E staff that analyzes resource decisions at these levels.

Conclusions

The basic conflict that arises between project or program managers and M/E staff must be eliminated if implementation efforts are to be successful. Managers need information to make decisions and an effective M/E system can provide it. Thus managers have to have an input into what information is collected and when it is made available. Managers must also be willing to receive bad news, in fact, even expect it and then take appropriate corrective measures.

To establish an effective M/E system requires flexible and realistic targets that include measures of social welfare and environmental quality changes in the watershed and river basin communities. All types of potential beneficiaries should be included in evaluations. Local beneficiaries are an important source of information that must be tapped. A special effort will have to be made to contact low income groups particularly those in isolated upper watersheds. Rapid appraisal methods can be used to collect information particularly for monitoring when timeliness has a high priority. In the past not enough emphasis has been placed on having the information available when it is needed.

Finally, an evaluation staff needs to be established that looks at resource use and management from both the river basin and watershed perspective. Only if the evaluation can be done from these levels will

potential externalities be identified and accounted for. Thus integrated river basin development and watershed management requires a M/E system that can measure and evaluate impacts from a broad perspective.

REFERENCES

Ali, Syed Hashim (1983). "One Season of Integrated Water Management in Andhra Pradesh," Irrigation Management Network, Network Paper 7d, 17p.

Bower, Blair T. and Maynard M. Hufschmidt (1984). "A Conceptual Framework for Analysis of Water Resource Management in Asia," Natural Resources Forum 8(4):343-55.

Chambers, Robert (1985). "Shortcut Methods of Gathering Social Information for Rural Development Projects," Putting People First (Sociological Variables in Rural Development), ed. M. M. Cernea, Oxford University Press, pp. 399-412.

Coward Jr., E. Walter (1986). "Direct or Indirect Alternatives for Irrigation Investment and the Creation of Property," Irrigation Investment and Management Policies for Developing Countries, ed. K. William Easter, Westview Press, Boulder.

Dani, Anis A. (1986). "The Watershed Community's Role in Protecting the Hindu Kush-Himalayan Watershed Resources," Watershed Management: An Interdisciplinary Approach, ed. K. William Easter, John A. Dixon and Maynard M. Hufschmidt, Westview Press (forthcoming), Chapter 11.

Dixon, John A. and K. William Easter (1986). "The Micro-economic Analysis of Watershed Projects," Watershed Management: An Interdisciplinary Approach, ed. K. William Easter, John A. Dixon and Maynard M. Hufschmidt, Westview Press (forthcoming), Chapter 4.

Galvez, Jose A. (1984). "Management and Cost of Watershed Reforestation: The Pantabangan and Magat Case," Seminar on Economic Policies for Forest Resource Management at Club Solviente Tagana.

Hoare, P.W.C. (1984). "Improving the Effectiveness of Agricultural Development: A Case Study from North Thailand," Manchester Papers on Development, Issue 10, pp. 13-41.

Hufschmidt, Maynard M., David E. James, Anton D. Meister, Blair T. Bower and John A. Dixon (1983). Environment, Natural Systems and Development (An Economic Guide), The Johns Hopkins Press, Baltimore, 319p.

Hyman, Eric L. (1985). "Monitoring and Evaluation of Forestry Projects for Local Community Development," Agricultural Administration 19:139-160.

Tubpun, Yuavares (1986). "The Economics of Small Tank Irrigation in Northeast Thailand," Irrigation Investment and Management Policies for Developing Countries, ed. K. William Easter, Westview Press, Boulder.

Uphoff, Norman (1985). "Fitting Projects to People," Putting People First (Sociological Variables in Rural Development), ed. M.M. Cernea, Oxford University Press, pp. 359-90.