EDI TECHNICAL MATERIALS

Irrigation Training in the Public Sector

Guidelines for Preparing Strategies and Programs

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Contents

1

Irrigation Development and a Human Resources Development Strategy

Accomplishments and Challenges

Public irrigation has contributed increasingly to satisfy national and international needs for food security. From 1964 to 1984, net irrigated areas of Asia, Africa, and South America grew by 40 percent, from 111 to 156 million hectares. This growth has yielded remarkable results. Cereal production in developing countries increased at an average annual rate of 3.4 percent through the 1960s and 1970s, two-thirds of which came from irrigated land. Countries such as Bangladesh and Indonesia have doubled the production of rice, their staple crop, within fifteen years, while India is now a net exporter of wheat. It is difficult to imagine how the world would have avoided a food crisis without these recent gains in food production made possible by irrigation. Irrigation has been the main stimulus to additional grain production in many developing countries.

Under the combined pressures of rapid population growth and economic constraints in many countries, such as India and Thailand, expanded irrigated agriculture has met the increased need for domestic staple products. To finance this expansion, these countries have regularly invested in irrigation over three-fourths of public moneys designated for agricultural development. The World Bank, the Asian Development Bank, the Government of the United States, and the Government of Japan invested at a combined rate of about U.S. $1.5 billion per year during the 1970s and early 1980s, with much larger investments by the developing countries themselves.

An expansion of this magnitude and duration can be expected to reach a point of diminishing returns. The remarkable benefits of irrigation are now more clearly seen as costly in several ways. The cost of new construction has increased sharply and many of the newer systems are deteriorating faster than expected. These problems are not really new, but during the past two decades irrigation departments have not sufficiently addressed the changing needs of irrigation. Similarly, research programs have not kept up with the needs of irrigated agriculture, and training has rarely been able to link research and world-wide experience with the realities of local operations.

As a result of these factors, it has become much more difficult to attract money for investment in irrigation. Irrigation finance extended by the World Bank, the Asian Development Bank, the United States, and Japan in 1986 fell to barely half that of 1981 in real terms. The necessity to sustain crop productivity and financial returns on often considerable investments has highlighted the need to operate and maintain irrigation schemes in a more effective and efficient manner.

The way to sustained productivity has been shown to depend on two factors: first, the capacity of irrigation organizations to meet the technological challenge of environmental problems, such as the scarcity and cost of developing new sources of water or the increased salinization of irrigated lands; and second, the ability of technical and managerial staff in these organizations to adapt to changing circumstances, such as crop diversification, and to ensure that their irrigation systems continue to be productive. In view of these factors, the effective operation and maintenance of irrigation systems are clearly most important. This in turn must focus attention on the effective management of human resources of each irrigation

department to reach production goals while safeguarding the significant investments these systems represent.

In the coming decade, one of the most important challenges to irrigation organizations will be their ability to use their technical and managerial resources effectively. To this end, irrigation departments must include training as an integral function of their operations and maintenance plans and include comprehensive human resource development as part of their long-term strategic planning.

Some management teams are already beginning to assess management and staff performance as a major factor in irrigation system performance. To help them formulate a systematic approach to training, they are asking some fundamental questions:

- How can training be instrumental in raising production from irrigated land? Who must be trained ? In what skills must they be trained? When is the training beneficial?
- What is the relationship between training and the overall performance of irrigation organizations?
- What improves the level of individual performance? To what extent will personnel motivations be affected by changes in the incentive structure, opportunities for career development, and styles of management?
- What kind of training strategies and programs should be formulated for managers and all levels of staff?
- How can you identify training needs?
- How can the institutional environment be made more compatible with attaining the intended development objectives? and
- How can the effectiveness of training programs be assessed?

Systematic and Department-wide Training

The present widespread interest in irrigation training is a natural consequence of the increased attention given to irrigation management around the world. The need for training and research in irrigation systems was discussed and debated at the first Technical Advisory Committee (TAC) of the Consultative Group on International Agriculture Research in January, 1971. At the 1987 ICID meeting in Morocco, 33 papers on irrigation water management training were presented by 19 countries (Boumedil, 1987) and participants reached five main conclusions during the 1987 ICID meeting with regard to training:

- Programs should be based on an assessment of the needs for training and developed in line with the organizational objectives;
- Programs should comprehensively and systematically enhance the skills needed by management, operating, maintenance, and administrative staff;
- Initial training of project operating and maintenance staff should be completed *before* new works are commissioned;
- Water users and their associations should be taken into consideration when developing training strategies. This may require complementary training programs on their behalf; and
- Training programs should be conducted as close to the field as is possible.

Most irrigation training programs seek to upgrade the technical skills of individuals in the field. While this is useful in many cases, evidence is accumulating that most staff already have the skills needed to carry out their assignments. They may, nevertheless, carry them out poorly, or fail to attempt them at all. Some reasons for these failures are lack of clear supervisory direction, physical conditions that prevent successful execution of the work, lack of commitment at various levels of the department, uncertainty regarding the purpose of the job and opposition from important constituents including farmers.

Relationships within the department have a major impact on the effectiveness of irrigation staff. In many countries, however, field-level staff develop closer, more dependent

relationships with local farmers than with their supervisors in distant central offices. Moreover, a wide range of factors, for example, low salary scales, work against the department orientation of staff.

Few irrigation departments have systematically helped their staff to contribute to the overall effectiveness in meeting the mandate of the department. Those that have done so possess a force of people who are able to project strongly the objectives of the department. The key strategy is to develop staff at all levels who are motivated and able to carry out:

- their own technical jobs;
- the development of subordinate staff;
- activities useful to the internal functioning of the department; and, in some cases,
- collaborative activities with other organizations in the irrigation sector.

Most managers of public irrigation departments recognize the new challenges before them, and are aware that training must go far beyond the periodic upgrading of technical and managerial skills. For example, substantial farmer participation in tertiary irrigation is well accepted in many countries, and senior managers increasingly accept the need for a more direct means of financing operation and maintenance (O&M) activities. Public planners in Brazil and several other countries realize that the management of irrigation by "District" organizations of farmers can be more effective than public sector schemes.

A training strategy that focuses on only one aspect of irrigation cannot lead to system-wide improvements. Comprehensive changes can be achieved through a training strategy that addresses the needs of different categories of managers and staff, as well as those of clients. It will also depend on the rejection of an assumption of individual training as a one time event. In most instances, upgrading skills will require much training, including formal, informal, in-house, and training center experiences. The order in which these training experiences are provided, and the role to be played by management in reinforcing the outcomes, are issues which should be carefully considered by those in designing a training strategy.

To develop a successful training strategy an irrigation department must:

- Determine which irrigation system constraints can be most successfully addressed through training;
- Identify the training needs of specific categories of managers, staff, and users;
- Select and design appropriate training segments and methods for each target group identified;
- Determine the logical sequence of training segments and create an appropriate schedule;
- Decide on the institutional location of the training function and the physical location of the actual training;
- Integrate training into the budget process; and
- Plan for follow-up, monitoring, and evaluation of training investments.

Training for Whom?

A successful training strategy must have explicit boundaries, the most important of which is careful identification of the people to be trained. In most countries, many organizations and people are active in the irrigated agriculture sector. The most prominent of these are discussed below. They are:

- Irrigation department and project staff with primary responsibility for designing and operating the systems (for example, line irrigation departments and project authorities);
- Staff of other organizations with irrigation-related responsibilities (for example, agriculture departments, public administration, universities).
- Farmers who are responsible for water management at the farm level.

Irrigation department staff

These guidelines propose strategic training choices appropriate for public-sector organizations that have primary responsibility for irrigation. These are departments that finance, plan, design, construct, operate, maintain, rehabilitate, and modernize irrigation systems. Their objective is to increase agricultural production and related benefits. They are not normally involved in agricultural activities such as research or extension, although in some countries they provide such services as input and output marketing and credit.

Irrigation departments[1] usually have large staffs and well–defined bureaucratic structures. Frequently, the structures have evolved over a very long time, giving a permanence greater than that enjoyed by most other government entities. Because of the rather specialized technological content of work of irrigation departments, their staff tend to develop strong internal bonds, but have relatively weak linkages with related departments or with the farmers they serve.

Staff from irrigation-related organizations

Irrigation endeavors are enhanced or diminished by the activities of staff in irrigation-related organizations, such as agriculture departments. In some countries, these staff have responsibility for irrigation at the farm level, and their training needs are quite obvious.

Training programs for staff of agriculture departments, command-area departments, and similar organizations active in the irrigated agriculture sector are numerous and in many cases effective. They may need strengthened capacity in irrigation-related matters. But their obligations and expected output are not the same as those of irrigation departments, and irrigation functions normally comprise a relatively small part of their mandate. Training needs of these organizations should be seriously addressed in the context of their own departments, not the context of the irrigation departments. Such training is not directly addressed in these guidelines. However, to ensure that the objectives, strategies, and programs for training in the related organizations are mutually compatible and supportive, liaison among the involved organizations is essential.

Farmers

Managers seriously interested in upgrading the quality of the work of their department in the irrigation sector may be surprised to find only passing reference in this document to the critical role of farmers and the need to upgrade their performance. A companion report, focusing on training for water users, is envisioned for the future. But as a first step, the focus on requirements of departments for training is appropriate because:

- Irrigation departments clearly have a mandate to provide irrigation services and to recruit and train large numbers of people to that end;
- Departments charged with managing water will be expected to "put their own houses in order" before attempting to upgrade the skills of farmers; and
- Governments directly disburse funds to irrigation departments, not to farmers, and need to know that these disbursements are cost-effective.

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1. Public institutions of irrigation to which these guidelines apply include ministries, departments, agencies, special authorities, *offices*, boards, administrations, projects, and schemes. For simplicity, this report uses the term "department" throughout to refer to all public-sector irrigation institutions.

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Developing a Training Strategy

Performance of Irrigation Systems and Agencies

There is no single criterion to describe "good" irrigation. The traditional measure of irrigation efficiency—the percent of irrigation water productively used by the crop—can be an important gauge, but has little relevance under conditions of abundant water resources. These conditions are often present when irrigation supplements rainfall, as in the case of main-season rice.

A second criterion is the agricultural output per unit of water supplied. This is a good measure of the value of water, but variation due to fluctuations in rainfall and varying crop practices reduces its utility as a measure of how well a system works. And because it can be estimated only after harvest, it offers little practical value in guiding day-to-day irrigation decisions.

Most irrigation managers have come to accept a combination of at least the four following measures in assessing how well their systems operate:

- The amount of water wasted from the system (the inverse of irrigation efficiency), because the supply of water is frequently limited and wastage is apparent;
- The effectiveness of irrigation in promoting farmers' objectives (for example, planting earlier, producing higher yields, producing a second crop);
- The degree of equity in water supply throughout the system; and
- The frequency and extent of repair and rehabilitation work required to the system.

Several other criteria often found useful are the following:

- The prevention of uncontrolled flooding;
- The effectiveness of drainage systems;
- The avoidance of salinization;
- The conjunctive use of surface water and groundwater sources;
- The extent of participation of water users in water regulation; and
- The cost of operations in relation to services delivered.

None of these measures is easily quantified under field conditions. Water flow measurement, required for the first two items above, is rarely carried out in a sufficiently reliable manner to be a useful measure of how well systems operate, especially at the secondary or tertiary levels. Assessing how well farmers' objectives are achieved is somewhat subjective and may involve crop yield estimates, which irrigation staff are not normally qualified to make.

Nevertheless, it is important that managers and staff of irrigation departments have performance targets to guide them. On the one hand, these targets should be as specific as possible and should exclude factors over which they have little control, such as crop yield levels. On the other hand, they should be flexible, taking into account variability in climate, soils, crops, and cropping intensity.

One such performance indicator is the degree of equity in distributing water throughout the network. Systems are normally designed to supply roughly the same per-hectare water flows to all units within the command area. Operations staff can be responsible for

achieving this objective, within the limitations imposed by the physical system and water availability. Equity at various bifurcation or offtake points does not necessarily mean accurate and continuous flow measurement; it only means that there is little sustained bias in over- or under-irrigation in different parts of the system.

The success of field efforts to operate at high performance levels can be determined by planning decisions made higher in the department. For example, if there is not enough water to adequately supply an entire system, a decision may be made to deliver all the water to a portion of the area and to rotate the portion receiving water each season. This would improve the equity of water sharing between the seasons, and equity of water distribution within the truncated system would also be easier to achieve.

To operate a system according to performance objectives is quite different from the routine administration of a system. In the latter case, staff largely supervise others, with little intent to intervene in managing water deliveries within the network. This hands-off policy stems from the lack of generally accepted standards of intervention, and because operations staff are generally trained to consider only the hydraulic properties of canal systems—that water will flow as automatically as the system permits.

Some Performance Issues

Most irrigation managers agree that the systems under their jurisdiction should operate at higher performance levels. They could improve performance by adapting or revising existing water distribution plans, but may not be able to do so for the following reasons:

Physical Factors

- The canal structures, cross sections, and gradients are not physically as originally designed; consequently the right quantities of water do not flow into or along specified canals;
- Department staff cannot measure or control water flows accurately enough to implement a plan leading to higher performance;
- Variation in water flows is so great and unpredictable that it is impracticable to put any standardized water distribution plan into operation;

Institutional and Human Factors

- Staff do not have sufficient ability or training to put a plan into operation;
- There are not enough staff to implement effectively a water distribution plan;
- Staff cannot be expected to put a water distribution plan into operation because they are strongly influenced by those few farmers who stand to benefit from disorganized distribution;
- Farmers generally may interfere with operating systems, particularly if they have not been consulted in the design;
- There is so much variability in crops and cropping practices that it is unlikely any plan would serve the interests of enough farmers to justify implementation; and
- Implementing a water distribution plan would inevitably bring department staff into conflict with staff of other organizations.

When present, these factors certainly limit the performance level at which systems can operate. It is unrealistic to train field staff under ideal conditions and then expect them to produce optimal results within systems that are handicapped by several of these factors. Nevertheless, old and partially deteriorated systems sometimes operate at relatively high performance levels despite their generally poor condition.

A strategy for high performance irrigation should not rely exclusively on the efforts of operations staff. The department should orient and strengthen the design staff so that the systems are designed to be easier to manage and flexible to serve changing requirements. Thus, training that leads to higher performance levels must include the planning and design staff, in addition to operations managers and staff.

Training programs designed only to help staff overcome their technical limitations overlook the institutional constraints that managers, staff, and departments face. For example, low salary scales or frequent transfers are department characteristics untouched by training programs. Similarly, irrigation responsibilities in most countries extend to two or more organizations which may work at cross-purposes. Agriculture and irrigation officers, for instance, sometimes act on quite different assumptions regarding cropping patterns and times of planting. Furthermore, the absence of effective water users groups will inhibit the development and implementation of efficient and equitable water distribution plans.

The Department Context for Irrigation Performance

Irrigation departments often perform poorly because of internal institutional constraints and weak linkages with other organizations. Improvements in irrigation system performance must begin with the irrigation department itself. Another important aspect is the relationship between the department and water users and approaches to training farmers. These will be the subjects of a future document.

The department context

In countries with extensive irrigated agriculture, irrigation organizations are among the strongest agencies of government. Sometimes, as is the case of Thailand, they enjoy the highest level of patronage and dwarf other departments in their ministry. Their staff may receive higher salaries and other perquisites unknown in other government agencies.

Irrigation departments have often become large bureaucracies with permanent staff stationed at many levels from rural village offices to cabinet posts. Irrigation officers in the field are frequently the most accessible government contact for farmers. In irrigated areas they are usually far more numerous than are agricultural extension or land revenue officers.

Irrigation department staff assignments tend to be fixed in terms of focus and location. Project design staff usually are housed at the headquarters of the department where they plan new systems based on engineering principles and department norms. Operations and maintenance (O&M) staff in the field are responsible for running and repairing systems after construction is completed. There is often little interaction and almost no rotation of staff between these units. Systems designers may make plans without the potentially valuable on-site knowledge of O&M personnel, and O&M decisions may have to be made within the constraints of an inflexible design. Consequently, departments do not usually consider a sufficiently wide range of design or operating options.

Department issues

It is not necessary for these guidelines to list all of the issues with which irrigation departments cope. But it is important to discuss several internal issues that condition and determine staff performance and thus affect irrigation system performance:

- *Inadequate or misleading information.* When the operation of main canals is based upon allowing specified flows at various reaches along the canal, it is important that the measuring systems work well and that the data are recorded and acted upon in a timely way. But frequently these data cannot be relied upon for operational purposes. Similarly, topographic data is rarely complete or accurate enough to permit optimum system layout and design.
- *Conflict with farmers.* The relationship between irrigation departments and farmers is frequently antagonistic. Farmers seek political support to oppose department decisions which were often made without consulting farmers in a meaningful way.

The field officers bear the brunt of this ill will, even though it is usually department policies that are under attack.

- *Conflicts with other organizations.* These often arise, when, for example, an agriculture department recommends a cropping pattern which is inconsistent with the water delivery schedule planned by the irrigation department.
- *Weak control over dispersed staff.* The widely dispersed, poorly paid, and infrequently supervised irrigation officers develop strong relationships with local farmers. This is a potential strength for the department if it values farmers' views and can act on them. But it frequently leads to a situation in which department staff act, at least to a degree, as farmers' agents. This relationship creates a climate in which some farmers may pay extra compensation to department staff, thus destroying the possibility of an equitably implemented water distribution plan.

The traditional definition of department performance

Irrigation departments traditionally have given high priority to technical competence. They place emphasis on solutions that are technically correct and efficient, and can be administered without undue delay or difficulty. These qualities are particularly appropriate where the water is very limited and strong rules govern equitable sharing arrangements.

These priorities have, in turn, shaped the character of the departments themselves. They tend to be somewhat inward-looking, favor strong technological and administrative orientations, and have a straightforward focus on water as an input. Irrigation departments have been comparatively less interested in joint efforts with other departments, new and untried solutions, and the outputs from water use. It is no surprise, therefore, that few irrigation departments have an ongoing research program analogous to that of most agriculture departments.

The administrative character of irrigation departments is perhaps their most significant attribute. It promotes highly centralized decisionmaking and emphasizes implementation of predetermined plans, with little delegation of authority. These departments run almost automatically, with few day-to-day decisions required except during times of crisis or change, when they are made at the highest level. Key staff skills include the ability to pass orders downward, handle papers smoothly, and help the unit function smoothly without the intervention of higher level officials.

Irrigation departments are custodians of a valued public resource—water—which is distributed according to a plan. Their responsibility is not unique; many agricultural banks and extension departments treat credit, seed, fertilizer, and information in much the same way. In general, they view as their mandate the provision of these resources in accordance with governmental programs and rules that usually specify the rates of supply to different locations over a given period of time. Performance is evaluated in terms of how well these requirements are met.

These characteristics have shaped the evolution of departments. They have strengthened those departments with relatively unchanging programs over the years, but have made it more difficult for them to adapt to new conditions.

The changing definition of department performance

Many departments, particularly in East Asia, have come to realize that the main issues which affect the irrigation sector have changed significantly. They have begun to question if the traditional roles and responsibilities of the department and its staff are adequate to meet the present and probable future needs of the sector. Specifically, some irrigation leaders are looking for greater managerial content in training programs and a focus on the needs of water users and the productivity of their farms; issues that are discussed below:

- *Managerial capacity* is obviously present in all departments. In some, however, it is being encouraged as a way of introducing greater flexibility in applying rules. Accordingly, more decisionmaking authority is delegated to lower-level officers. In some cases, the rules themselves have been revised; for example, to accommodate the need for changing target rates of flow for different weeks or locations. This calls for fewer centralized and predetermined rules and greater day-to-day local management.
- *Client orientation* has become the hallmark of the communal irrigation program of the Philippines National Irrigation Administration (NIA), an effort to get farmers to take on much greater responsibilities in operating, repairing, and financing systems under the direct control of NIA. Formal mechanisms for communicating between the department and farmers were required as a first step. Other irrigation departments are finding that a more explicit client orientation helps protect them to some extent from farmer opposition, often supported by local politicians.
- *Focusing on results* means giving attention to the effects of irrigation, not just to the supply of water as an input. Monitoring of cropping patterns, dates of planting, and yield levels are important to this approach, although the irrigation department does not need to do all the monitoring itself. It may make fuller use of data collected by other departments and also help them to collect information in ways which later will be more useful for irrigation purposes.

The changing definition of performance referred to above requires many institutional adjustments in the department itself. Most are relatively small steps in themselves, but require a substantial commitment to change the way the department perceives its role and conducts its business. For example, to achieve greater farmer involvement in operating and financing systems would require new mechanisms for meeting with farmers on a regular and structured basis. More delegated decisions would require some reallocation of responsibility and authority to the field in order to reduce the travel expense and time required to reach an appropriate decision.

It is an oversimplification to characterize all irrigation departments as traditional—*administrative, self-centered, and input-oriented*—and unresponsive to change. However, under present and future circumstances, improved irrigation performance will be more likely for those departments which become increasingly *managerial, client oriented, and focused on results.* In considering these changes, senior department officials need to evaluate the institutional environment of the department—not just its physical systems—and how effectively the department is structured to deal with it.

Today's irrigation environment is more complicated and dynamic than ever before. The political environment is more responsive to the demands farmers make of the department. The economic environment has changed as self-sufficiency in food has largely been reached in some of the most important irrigated countries. Farmers may look to irrigation not so much as an input to raise yields but as a means to shift the cropping season to different months, or to increase the wage rate of daily labor. Unintended harmful effects of irrigation, such as the risk of salinization, must be dealt with rapidly and seriously.

In considering these and other changes, the senior management of an irrigation department seeks to match the new conditions with an appropriate strategy. A central element of the strategy is a systematic approach to staff training. Without it, management's intentions are unlikely to be fulfilled.

The Need for Systematic Training in Irrigation

Staff training is now universally accepted as an essential element of organizational "management." With respect to irrigation management, Robert Lenton (1988) has proposed the following definition:

> "Irrigation management is the process in which individuals set objectives for irrigation systems, establish appropriate conditions, and identify, mobilize and use resources so as to

attain these objectives, while ensuring that these activities are performed without causing adverse effects."

Training for irrigation normally includes pre-service, university-level preparation for technical staff who are then recruited by the department; post-graduate courses on special aspects of irrigation; staff college training; orientation for newly inducted staff; short-term refresher courses; specialized courses; training linked to a specific project or system; on-the-job training; international short-courses; and seminars and conferences either within or outside the country.

A recent department-wide training survey in Sri Lanka found that the number of professional people trained in recent years equaled the total number of professional staff in the department; while training opportunities at the operational or field technician level were equal to about one-third of staff. The survey also found that the training offered by a wide range of institutions, universities, and international organizations was not effectively coordinated, nor was any central record or personnel inventory kept of those who had undergone training. These results are probably similar to what would be found in irrigation departments in many other countries.

The survey revealed that international organizations partially finance a high proportion of the training courses most of which were offered and funded through specific projects. Such short-term, specific training was aimed to improve the effectiveness of design or O&M staff assigned to operate a system, but could not seriously attempt to improve the way the department itself operated. Few of these training activities were related to or supported each other.

Categories of Training

"Training" encompasses a wide range of planned activities designed to strengthen the performance of managers and staff. Three types of training that would be included in a systematic training plan as proposed by these guidelines, and their relevance to different situations, are presented below. The distinctions among them are rather arbitrary and in some respects they overlap.

In-service and maintenance training

This is intended to maintain staff skills at given levels of proficiency. It may be called short-term, routine, continuing, in-house, or on-the-job training for existing or new staff members. Its objective is to strengthen the technical skills of staff when they join the department or are to be upgraded. In-service training is not usually intended to impart more skills than are required for the positions currently held. It may be used to certify continuing or increased staff proficiency within the same career path.

In-service training is closely linked to the vocational training staff usually receive as part of their pre-service, formal education which qualifies them for employment. At the time employees first join the department, their skills should be assessed and recorded. New employees should then be listed for the particular in-service training activity or activities which address their shortcomings. This procedure may be repeated periodically to keep staff abreast of their fields and closely responsive to the requirements of senior management.

In-service training frequently is seen by staff as a path to promotion. When this happens, it often becomes only a tool for personnel management rather than as a means to improve performance. At worst, in-service training is used temporarily to relieve operating units of unsatisfactory staff.

Adjustment or reorientation training

This may be required following changes in policy or technology when irrigation staff may be called upon to undertake new jobs for which they are not adequately prepared. In the

1970s, the National Irrigation Administration of the Philippines decided that the Water Management Technologists of its Upper Pampanga River Project should advise farmers about agricultural matters. Training was needed in agricultural extension skills. Some irrigation systems in Thailand are now equipped with double-gated outlets. Training was required to use the outlets as designed. Irrigation staff in many countries are increasingly expected to bring farmers into compliance with, or at least acquiescence to, water-related matters. For the success of these and many other examples of change, training must be redefined to bring staff capabilities in line with new departmental objectives. This is adjustment training.

Adjustment training is usually carried out through one or more of three formats:

- *Specialist training* is short term and may be carried out through special courses at local institutions. Regional or international experts may be brought in to supplement local experience, if needed. Study tours are an example of specialist training for adjustment purposes. Superintending engineers from India have gained new perspectives on farmer-managed irrigation through well-prepared visits to other parts of India and to the Philippines and Indonesia.
- *Refresher training* is a course of study in the staff person's field of basic qualification that will introduce new concepts as well as reinforce earlier training. The refresher training should focus on the skills needed to perform the newly designed job properly. Refresher training is usually of relatively short duration and includes some theoretical background.
- *Retraining* is needed when a staff member is moved from one type of job or career stream to another. This frequently happens when there is a significant shift in the mandate of the department, or when certain phases of organizational development are complete. Some irrigation departments have retrained design staff to operate irrigation systems when a permanent slowdown in new construction is anticipated.

Project and task force training is a special category of in-service training that is particularly appropriate for pre-commissioning training of staff not yet in place for new projects. Assessments of training needs for new projects differ from the TNA procedures in Annex B, because new projects focus on the whole range of irrigation skills, and not just those skills related to performance requirements. Assessments for new projects must also evaluate the employment pool and the capacity of relevant training institutions to provide the necessary training within the desired time frame. It is usual to distinguish between training for the construction phase and, at a later stage, training for operational and maintenance work.

Unlike adjustment training, which is undertaken concurrently with operational activities, project and task force training should be carried out so that all aspects of the scheme will take shape in accordance with a systematic plan and with necessary staff properly trained in all aspects of the project. The required numbers of staff and their training needs depend on the institutional design of the new scheme. There are generally three alternatives:

- Projects wholly under the irrigation department;
- Projects with the more traditional joint management (government and farmers); and
- Projects intended to be managed by farmers. Project training has to be built into the whole process of project planning.

Task-force training is a form of project training in which the key staff to be involved in an aspect of the project receive training as a team before that aspect of the project begins. Task force training strengthens interaction among the various team members. Management training is an important part of a successful task-force approach and is being tried in some projects, including some under the Department of Irrigation in Nepal. The main problems encountered with task-force training are difficulties for the department in scheduling teams of staff to be available for training at the same time, and in devising new training methodologies based on team participation.

Purpose of Current Training

Training for operations and maintenance

Most irrigation department training in recent years has been designed to provide the skills and knowledge with which staff (and farmers) can direct or distribute water. These programs have focused on the measurement and control of water flows in operating systems. They have emphasized the use of measuring devices such as double-gated offtakes, monitoring of canal flows, estimation of crop-water requirements, and some of the principles of canal design on which flow measurement is based.

In the last decade these training efforts have been broadened to help field staff assess how well or badly the systems operate. Some training emphasizes rapid appraisals of the system, which include not only water distribution, but also crop productivity, farmer satisfaction, and other factors related to irrigation.

Training for planning and design

In recent years, some attention has been paid to training design staff. This training is intended to upgrade the quality of irrigation planning and design, which in many countries is still excessively time-consuming and costly and frequently results in systems that are difficult to build and operate. Systems built 50 or more years ago are now generally regarded as better designed than those designed more recently.

Staff designing irrigation systems must often depend on remarkably misleading and incomplete information on the topography and other parameters on which their design is based, and they have little experience in relating engineering principles learned in the classroom to real conditions in the field. Due to the unprecedented pace of irrigation development, however, they must turn out designs faster than ever. Training to bring closer awareness of field conditions into the design process would be particularly valuable.

General observations

First, training programs are often *project-specific*. Because they are normally financed by external organizations as part of project loans or grants, the national departments may not have local funds for more general training. Thus, the benefits of training are found largely within the limited projects and do not benefit the department as a whole.

Second, this training usually focuses on the *technology of irrigation*: how to design systems and how to move water through them. There is growing recognition that irrigation technology must also take into account environmental considerations and sociological characteristics such as farmers' behavior. Current training continues to focus mainly on strengthening staff competence in the technical aspects of design and operation.

Third, conventional training focuses on staff in *discrete, hierarchical* levels of a department. The ability of trained staff to put into practice what they have learned is often limited by individuals in positions above or below them, who often remain outside the scope of the training.

Technological training in water management should remain a very important part of the total training strategy, for ultimately the primary benefits of irrigation are closely associated with the physical distribution of water and how well that distribution matches the needs of farmers, crops, and soils. But technological training in the future should be carried out within a broader framework that includes developing the management capacity within irrigation departments and projects. Human resource development programs for most large organizations should also include training in:

- Planning (including corporate and strategic planning, organization planning, and financial planning);
- Assessment of cost/benefits and performance;
- Leadership and management skills; and
- Information management.

3

Systematic Training

Training in one form or another is well regarded by most staff as a means to advance within their department. In addition to its personal value, however, sound management training is very important to proper unit management and project implementation.

Training as a Tool for Senior Management

Heads of large irrigation departments sometimes believe they may not be able to carry out changes which they know would benefit not only the department, but the irrigated agriculture sector as a whole. This explains why they sometimes do not fully implement the recommendations for change stemming from research or the conditions attached to loan contracts. Senior management may agree with the intent of the proposed changes but doubt that their staff has the commitment or ability to carry them out, or that they themselves have the capacity to communicate the vital importance of the proposed changes. Many senior managers also have quite definite ideas of beneficial changes they would like to introduce.

There are many reasons why these desirable innovations are rarely implemented, but one of the strongest is the inertia of the department staff whose natural pre-disposition is to resist changes that may affect them or their place in the department. They often do not understand or share the overall objectives of the managers of the department.

In Asia, the structure and historical nature of large irrigation departments explain much of this inertia. Relying heavily on irrigation rules and traditions, some dating back more than a century, managers reinforce their staff's concern for continuity. It is difficult to train a field officer to do things differently when the rules and traditions defining the position have remained the same for so long.

But there are important reasons why the senior management needs a more responsive staff. One is the need to match staff skills more closely to present irrigation conditions. These conditions have changed rapidly in the last twenty years and will change even more in the future. Many managers and directors would like to realign their departments to match the new conditions better. They would like to build an organization which could adapt more readily, while retaining a strong body of rules to assure continuity.

Department leadership also has recognized the value of closer linkage with other irrigation-related departments of government. At present this linkage is not strong in most countries. Linkage with agriculture departments is typically so distant that new structures, such as command area development authorities, have been initiated to help bridge the gap. National or state administrative staff colleges often could be used more deliberately to promote inter-institutional understanding and collaboration.

From the management's point of view, appropriate training programs are those which strengthen its overall control, permit innovation in providing irrigation services closely matched with current needs, and contribute to the unity of the sense of purpose of the department. For this reason it is important that all staff know, understand, and share the departmental objectives—this subject is discussed more fully in Chapter 4.

Training as a Part of Staff Development

Chapter 2 described some forms of training that strengthen staff technical knowledge. This is relevant to the needs of the department, especially if newly joining staff are not well prepared. In addition, the fact that staff usually see training as a means to advancement has peculiar ramifications since most individual-skills training is essentially designed to strengthen employees' skills within their present posts. Some of these programs even stipulate that trainees must remain in their present posts for a year or more after receiving training. But at least as important to the long-term interests of both the department and the trainee is training that equips both to deal with new problems.

In recent years considerable interest has emerged in training irrigation department staff about agricultural matters and training agriculture staff about irrigation technology. This training has value in promoting a more client- and results-oriented approach as described previously, but should not be highly technical or detailed. Irrigation department staff should understand how irrigation can be most useful for farmers and their crops, and know enough about farming to relate effectively to farmers, but they should not be expected to carry out the whole range of agricultural work.

Systematic Training: Some Concepts

Most irrigation departments have managed to provide many training opportunities, but often have failed to design and implement systematic department-wide plans to upgrade and maintain the skills and motivation of their managers and staff. They have supported discrete training activities rather than comprehensive programs of what may be termed human resource development. Furthermore, in very few cases has any attention been given to the effect of retirement and recruitment on the skills-mix available or on management succession planning.

Company-wide training programs are widely practiced in private-sector firms, including those based in developing countries. They are regarded by corporate management as essential to recruiting and retaining high-quality staff, and a means by which the management can directly influence staff. Specific job descriptions and performance evaluations form essential parts of such a program. These programs are designed to enhance the knowledge of both managers and staff and to link that knowledge with measures designed to improve departmental performance. They are essentially about achievement of positive results and not only about statistics on skills and management training.

How an irrigation department would implement such a plan can only be specified by the senior management of that department. In that process, the following strategic issues should be considered.

Comprehensiveness of levels

The program should offer some form of training to all managers and staff in the department in order to build morale and a more responsive workplace and to provide technical knowledge at all levels.

A program covering essentially all staff levels would be effective because strengthened staff contributions at one level would be complemented, rather than impeded, by those at higher and lower levels. Individuals who should be involved in a comprehensive program include:

Senior Managers,
Middle Managers,
Supervisors,
Professional Staff,
Administrative/Clerical Staff,
Technicians and Operators.

The skills which might be appropriate for individuals in the above positions are listed in Annex C.

A comprehensive training strategy would reach across all projects and regional offices of a department, so that staff transfers — which are bound to occur in irrigation departments— would not seriously disrupt the effectiveness of the department.

Matching methods to target group

Each specific training activity within the program should be carefully matched against the appropriate staff level. For example, technical on-the-job training might be appropriate for technical field staff, whereas brief seminars would be more appropriate for managers and other senior officials. Eventually, when the training plan is well underway and accepted, management may wish to design specific individual training opportunities rather than a more generalized program. The skills proficiency and training history of each staff member should be recorded in their personnel file, routinely updated, and regularly reviewed.

Department initiative

An outside institution is usually not in a good position to advise on the details of training for a department. To be successful, the training should be the result of a research and planning process carried out by senior management. Training consultants and institutions are available to assist management in developing such a plan, but their involvement should follow, not precede or substitute for, department initiative.

Establishing Comprehensive Training Programs

Assuming a departmental goal to implement a comprehensive training plan, it is not necessary immediately to reach all staff or staff levels. There are advantages in initially training a relatively small group, even if that group thus becomes an elite unit within the department. The Upper Pampanga River Project within the Philippine National Irrigation Administration held such a position until many of its attributes were absorbed by the parent department.

To achieve the most impact, a comprehensive training plan should be managed by a very senior department officer. The person with responsibility for implementing the plan should report directly to top management if the program is to serve their interests as well as those of the staff as a whole. While overall departmental coordination and direction is essential, it is equally important that the program is adequately funded and strongly supported by individual managers. The training and development of subordinate staff must be seen as a direct responsibility of managers and supervisors at all levels in the department. They should be involved in identifying training needs and in implementing some program elements.

Some training activities envisaged within this program may be quite similar to those already being offered. The basic differences will be the greater scope and closer attention paid to matching the activity to the needs of the staff and the department. In particular, the scope of the training program for managers and other higher-level staff, who do not usually receive much training under conventional programs, will be much broader and stronger.

Some of the most appropriate activities for senior officials are workshops and seminars of several days duration. These may be arranged in the home country or, in association with other institutions, in both the home country and abroad. If the training is held abroad, the department should play an active role in defining the scope and content of the activity.

4

Strategic Decisions in Planning for Training

Initial strategic steps in planning and selecting appropriate training activities are outlined in the following suggested sequence:

- The objective, targets, and goals: the corporate mission statement;
- The functions and tasks to be performed by management and staff, consistent with agricultural sector policies and structures;
- The relative priority of tasks, including coordination with other agencies and users;
- The definition of requirements for training;
- The organization and implementation of the training program;
- The budgeting for a training program, periodically to be reviewed; and
- The follow-up, monitoring, and evaluation of the training program.

Development Objective

To achieve effective management, the relevant management authority of any organization must first develop a clear statement of the mission or purpose of the unit— those functions the organization is to perform, and for which it is to be accountable. Such a statement, sometimes referred to as a "Mission Statement" or "Corporate Plan," should set forth the general philosophy and goals of the organization. It usually provides, as well, general guidance on human and financial resources; physical systems and technology choices; and information systems and performance management. An example of a "Mission Statement" is included as Annex E.

The Corporate Plan, which sets the overall policy for the organization, will require periodic, systematic review in the light of experience and changing circumstances. Changes may be required in the plan because of modifications in the socio-economic context, new technology choices resulting from research, or shifts in price relationships. While the overall policy objectives may remain unchanged, technology choices, human resource and financial allocation and the rate of implementation may have to be modified. A plan that is realistically conceived will hold up well through such modifications.

Functions and Tasks Performed

Several government agencies, as well as the farmer and other water users, are usually intimately involved with the many aspects of irrigated agriculture. All the involved parties should be clear about their own functions and responsibilities and should also understand how these relate to the functions and tasks of others. Effective collaboration should, in fact, be a mandated function for all concerned parties. Functional and task responsibilities should then be defined at the work-unit level and, finally, to be set out in job descriptions for individual managers and other staff members.[2]

2. A further discussion of this process is given in Chapter 1 Section D of the "Guide for the Preparation of Strategies and Manuals on Planning the Management Operation and Maintenance of Irrigation and Drainage Projects" (ICID World Bank, June 1989).

Priorities for Critical Tasks

The relative priority of the many tasks involved in irrigated agriculture will change over time. Certain functions, such as ensuring public safety, may always be of major importance. On the other hand, management of construction will be important only during the development phase of a new irrigation scheme. Plans to recruit and train managers and staff obviously must take into account changes in the priorities of other critical tasks, while maintaining a coherent overall staffing and training program.

Training Program Specification

Training should be a continuing activity in any public organization and is required for managerial and all other staff. However, it has seldom received continuing support from senior managers because its value is often unclear and its impact is uncertain. For this reason, well designed and implemented programs of training that lead to real performance improvements, increased staff motivation, and commitment to change are of particular importance. The issue is to select the right subject areas and sequence of training for people who can and will make a difference to overall performance.

Two converging activities are needed to specify an effective, permanent staff training program. The first, and more fundamental approach, is to define, in quantitative and qualitative terms, the staffing characteristics that will be desired by some future time, perhaps in five or ten years time. This is particularly important in developing a program for induction training and for predicting future demands for university trained staff. The second, and more usual approach, is to analyze current performance discrepancies and decide which deficiencies may be corrected with management or other staff training. This second approach commonly requires a Training Needs Assessment (TNA).

TNAs are usually conducted when identified problems of irrigation performance are thought to be amenable to a training solution. But such assessments should not be conducted only when serious problems arise. The information assembled for an irrigation department TNA is essentially the same as that required to maintain a reliable record of staff and system performance. TNAs, therefore, should be an intrinsic part of the management process.

The following issues should be considered when preparing a productive TNA:

Training does not solve all performance problems

There are many problems of irrigation performance that cannot be solved by staff training. Training of operations and maintenance staff, for example, is not likely to improve the performance of systems that are in bad physical condition. Similarly, where performance problems can be attributed to absenteeism or poor staff morale, organizational policies, not training, should receive urgent attention.

Before finally deciding to conduct a full-scale TNA, the current deficiencies should be identified and defined and a determination should be made as to whether or not training is likely to remedy the problems. Only after training is determined to be a fairly certain solution is it advisable to undertake a comprehensive TNA that can support efforts to design an effective training strategy and program.

Irrigation problems that result from poor performance of staff who have not mastered technical skills are among those most amenable to training solutions. Such easily remedied technical skills include estimating rates of water flows in canals and estimating and recording areas cropped at certain times during the season.

TNA methods

It is often assumed that different methods of needs assessment are required for different situations — for example, that training needs of individuals should be assessed differently

from those of departments. Procedures for assessing individuals are, in fact, selected from among a wider set of procedures used to assess departments. They include, among other things, references to reports and records, and use of external specialists to analyze specific aspects of irrigation performance and responses by managers and staff. However, processes for data collection—surveys, questionnaires, expert panels, peer group reviews, and direct observation—are common to almost all TNAs.

TNA data

Two types of data are particularly important for successful TNAs:

- Information that identifies the nature and extent of irrigation performance shortcomings, and
- Accurate and complete personnel records.

Information on *performance shortcomings* may be available from monitoring units where they exist; but for most countries in which monitoring is not yet well-established, a thorough assessment of how well the irrigation system and the department performs would be required before the decision is made to carry out a TNA.

A *personnel inventory* based upon employment records can provide an aggregate picture of staff performance, levels of skill, experience, formal education, in-service training and aptitudes. It should also include information about frequency of transfers, terminations, resignations, and retirements, as well as potential for normal staff advancement and promotion. This information is important to planning the department's manpower requirements and to understanding the likely impact of training on irrigation performance. Departments should maintain locally a uniform human resources information system. Centrally-located personnel files should contain less detail, but local managers should be fully informed of all aspects of their staff.

The most time-consuming part of conducting a TNA is to assess the skill levels of all critical personnel categories, such as junior engineers (sectional officers or watermasters) and executive and superintending engineers. This time can be reduced substantially if an up-to-date personnel inventory is maintained, especially if it includes supervisory evaluations of staff performance.

The process of carrying out a TNA can be summarized in the following seven steps which are elaborated on in Annex B:

- Define performance shortcomings;
- Define the degree to which the shortcomings can be resolved by training;
- Select assessors for the TNA;
- Set performance and skill standards for key managers and staff;
- Draw profiles of the skills proficiency of key managers and staff;
- Define the gaps in skills of key personnel; and
- Determine which personnel to train and on what subjects.

The way in which the TNA is carried out is likely to determine the success of the resulting training program. The key questions are:

- Does the whole process have the strong and declared support of senior management?
- Are operational staff involved in designing the TNA?
- Are all levels of management and staff consulted during the TNA?

Additional suggestions are given in Annex B.

The Organization and Implementation of Training

Selecting appropriate elements of a training program.

Having reviewed the types of performance problems encountered in irrigation and a range of different training methods, we turn now to selecting appropriate activities.

Most irrigation problems can be addressed through a process of change that can be facilitated with suitable training activities. These activities differ in each situation, and irrigation departments must decide which category of training is most appropriate to solve their current problems. Some of the more useful systematic training activities are discussed below.

Supervised on-the-job training

This is potentially the most effective means of upgrading the skill levels of individual staff, if the department clearly supports the training. To attain maximum success, the department must find appropriate supervisors to provide the training, and convey to supervisors and participants, alike, the importance the department attaches to on-the-job training.

Virtually every irrigation department or project has some supervisors with the experience, knowledge, and communications skills to organize and carry out on-the-job training. However, for a variety of reasons—seniority, protocol, and discipline, among others—the most appropriate supervisors may be overlooked as possible trainers. The best on-the-job training supervisors are those who can impart to staff their sense of good judgment, along with their technical mastery of specific skills.

Initially, the supervisors providing on-the-job training will require guidance. External training consultants with extensive field experience may be useful in helping to set up the training. The department should also assist by providing training materials, transport, and other logistic support. Most on-the-job training can be completed in one or two weeks.

On-the-job training is an effective way to deal with specific skill gaps, because the missing element is usually in staff ability to apply in the field skills they have mastered in the classroom. But perhaps the most important change accomplished through on-the-job training is attitudinal: it instills, throughout the department, a sense of individual confidence and a climate of self-help improvement. Departments that make skilled and repeated use of on-the-job training have well-established means of communication within the department and clearly demonstrate their commitment to improved irrigation performance.

A common observation about on-the-job training is its gradual evolution into a more formalized course offering. Formal courses are relatively less costly, more convenient to schedule and hold, and easier to teach. Formal courses have an important place as discussed in the following section. They should complement on-the-job training, rather than substitute for it.

Formal courses

Courses, such as those of the Water and Land Management Institutes in India, are often appropriate mechanisms to strengthen individual skills. Many formal courses, particularly longer ones, impart information on a wide range of topics, only some of which may have an immediate bearing on the performance of the individual participants and the units in which they work. Long-duration courses, unless intended for retraining, may not offer distinct advantages in either time or cost over the recruitment of new, well-trained staff, where they are available and when the irrigation department has that option.

The most effective formal training is often provided by a course that rectifies specific skill deficiencies of a group of individuals with similar backgrounds and job assignments. Such courses are most appropriately given in-house. They may be expensive to prepare, however, in relation to the numbers of staff trained, unless the basic course can be repeated many times.

The major problem with formal courses is to find suitable instructors. External institutions are not normally in a strong position to provide them. Experience suggests that the best instructors usually come from the irrigation departments themselves, as they are able to maintain a sharp focus on the participants' work environment. External training consultants

and other specialists may be called upon to assist with formal courses. The continued use of proven consultants for successive courses is generally more satisfactory than hiring new consultants each time. Formal courses do not offer much scope for dealing with problems of staff morale and attitude.

Workshops and seminars

Workshops and seminars are less appropriate for individual training, but can provide a good way to improve the effectiveness of the department as a whole. In practice, there is not much distinction between workshops and seminars, except that workshops are normally expected to produce an output—frequently a set of recommendations—whereas seminars are largely opportunities to exchange information. In the following discussion, the term "workshops" refers to both workshops and seminars.

Workshops are an excellent way to train managers and senior–and middle–level technical staff. They provide useful opportunities for personnel from both the department and other organizations in the irrigation sector to exchange views and learn from each other. Because they involve senior people, they must be carefully planned and carried out with due regard for protocol and interdepartmental sensitivities. The timing and location of workshops must fit the schedules of busy people, yet provide an atmosphere that is conducive to openness and informality.

A prerequisite for successful workshops is a clear focus on a limited set of issues. It is easier to gain agreement among participants on narrowly defined topics than on broad ones. As participants work together in a relatively narrow context, they develop mutual understanding that will later enable them to collaborate on issues of a broader nature.

Successful workshops involving relatively high-level participants should be prepared by a respected professional or an academic person perceived to be neutral, rather than a leader of one of the organizations involved. External training consultants can also be valuable resources for workshops, provided they have broad experience with such meetings.

Irrigation performance is frequently constrained because of factors "beyond the control" of the department. These may include the external context or environment of the agricultural sector or even the national economy. Workshops are an excellent means through which staff can be sensitized to some of these forces. They are then better able to adjust to and even influence some of these constraints.

Study tours

These are controversial training activities because of their cost, limited participation, and potential for abuse. Yet study tours, such as those carried out with senior irrigation officials from India during 1980–82, can have a long-term impact far greater than might be expected.

Successful study tours are in effect seminars or workshops conducted in several locations and with a substantial field component. Their success derives from many of the same principles described for workshops. It is not always necessary to provide overseas travel for study tours; large countries such as India can provide a wide range of new field experiences to Indian irrigation personnel without taking them out of the country. The attraction of travel is, however, a strong incentive for senior irrigation staff to participate in study tours that take them to foreign counties.

Study tours are perhaps the most effective way that senior management can begin the process of changing key policies. In 1987, for example, relevant irrigation organizations in India planned and carried out a study tour in India and two other countries specifically to acquaint participants with the latest experience in farmer management of parts of an irrigation network.

People from a range of institutions and locations within a country come together as a team when they participate in a study tour. Many of those who then return to an active

professional life can be extraordinarily influential in opening their units to key policy changes.

Internships

Internships, in effect, provide extended in-service training with another organization. They are most useful for imparting to selected staff the workings and culture of those organizations. Internships can also be effective ways to train staff in new disciplines, such as research methodologies.

Departments generally tend to nominate junior staff who are not in critical positions as interns. This does minimize the impact of losing a staff member. But, as novices, many interns can not convey to their temporary institution a strong picture of the sponsoring department, and they may not gain as much from the experience as expected. Nevertheless, a limited number of internships remains an effective way by which irrigation departments can bring in new ideas and skills, and interact productively with other agencies concerned with irrigated agriculture.

Location of the training unit

A choice that often must be made at the outset of any new training plan is whether to set up a training unit within the irrigation department or to make use of outside training capability. Internally conducted training has the advantages of greater department control, fuller use of department staff and resources, and, perhaps, lower costs. However, it does have several disadvantages. First, it may not have access to some of the best training expertise available to the sector. Second, it will not be strong in areas, such as agronomy, not normally within the immediate responsibility of the irrigation department. And third, it may not be perceived by staff as a prestigious benefit. In many countries, administrative staff colleges or other training institutes exist and may be able to provide suitable training for irrigation personnel on some aspects of their work.

In-service and on-the-job training should usually be carried out directly by the concerned department. This training strengthens the skills of its staff and builds a more responsive bureaucracy capable of change. But training of managers and senior- and middle-level staff in many cases may be more effective if conducted jointly with other organizations.

A physical center

A related question is the value of a physical center or campus dedicated to irrigation training. Several countries have constructed irrigation training centers during the past twenty years, but some of them now stand unused.

A training center comprising buildings and perhaps some irrigation hardware gives an important sense of permanence and continuity to training. The center may warrant a separate line in the department's annual budget, thus increasing the security and prestige of the training staff.

Irrigation training activities at a specialized campus can become too academic and remote from performance problems in the field. The in-house training staff may even conclude that training outside the center is unimportant and should not be supported. If these views prevail, the department is left with essentially no on-the-job training, only formal classes which strengthen traditional ways of doing things, rather than promoting change. This situation often leads to the assignment of inferior staff as trainers, which further reduces the value of the training center.

A training center appears to make sense only when a department has a strong commitment to training for change; when ongoing training activities carried out in the field are strengthened, not bypassed, by training at the center; and when the center is staffed on a rotational basis with the ablest senior-and middle-level department field officers.

Research and training

Experience from higher education indicates substantial benefits when training, research, and the provision of advisory services are combined. A research component provides new information to feed into the training function, which otherwise tends to become tradition-bound. Furthermore, combining a research function with training may increase the program's appeal to competent staff who may not wish to be associated with a training program alone. The third element—consulting—ensures that research and training staff are faced with practical problems and have the opportunity to put their ideas into practice.

The Water and Land Management Institutes in India and some international centers have combined research with training. But—with the exception of routine measurement of evapotranspiration and similar data—most training programs mounted by irrigation departments do not have significant research functions.

It appears that when irrigation training and research are combined at the national level, the former strengthens the latter; but the reverse may not occur. This is because in many countries irrigation research capacity is even more limited than training capacity, so the research mandate may retard training rather than strengthen it. Furthermore, traditional irrigation research has tended to focus on physical and biological effects of water use, not on operational and management decisions. That focus does not support the innovative training activities needed by irrigation departments to overcome their performance shortcomings in a changing environment.

Judgment in irrigation

Irrigation systems, as mentioned in the early chapters, have traditionally been run according to rather set rules and norms. These have the advantage of being clear and presumably impartial, and allowing minimal opportunity for field staff to use the system for their own purposes.

One of the objectives of the training strategy envisaged in these guidelines is to enable the department and its staff to respond intelligently to changes in the system, such as those related to water supply, farmers' wishes, or the system's external environment. Within limits, training should enable staff to use sound judgment in applying irrigation rules with some flexibility.

How much creative judgment irrigation staff should be encouraged to use is largely a policy question. In constraining situations where water is in short supply, where system operation cannot accommodate much variation, and where field staff have not earned the trust of senior management, the exercise of judgment by field staff cannot yet be encouraged.

But it should also be a department objective gradually to ease these constraints. As they become less binding, the department and its staff will achieve higher performance levels by exercising somewhat greater judgment in discharging their duties than is the case at present. They can be helped to learn sound judgment and sensible limits to its use by taking part in appropriate training activities.

Budgeting for a Training Program

Training is a continuing requirement for all levels of management and staff, and yet time is often not set aside and funds are not provided for this important function. During the construction phase of an irrigation system, training can be regarded as part of the initial investment costs, both in terms of its financial and staff time requirements. After the system is in operation, the cost of training should become an integral part of the costs of operations.

The proportion of management and staff time devoted to various forms of training varies very widely, according to the nature of the enterprise. Some private corporations dealing with rapidly changing technology may devote over 20 percent of their administrative budget to improving the performance of their staff. For irrigation departments, a range of 3

percent to 5 percent of staff time has been suggested as appropriate. However, each case should be analyzed separately. In all circumstances it is important that time and funds are specifically designated in the budget for management and staff training.

External borrowed and grant funds are appropriate for pre-commissioning training costs and to set up facilities and the training capacity for continuing operational training. However, the recurrent cost of operational training should be covered by domestic sources of funds, as it is an integral part of the cost of operations and maintenance.

The Follow-up and Evaluation of Training Programs

At the end of each training activity it is customary and useful to seek the opinions of the participants on the substance and the process of the event. This evaluation is not sufficient to assess if the training has effectively imparted new skills or attitudes to work that will improve the performance of the trainees. It is, therefore, necessary to have some form of systematic follow-up some time after the training event.

The follow-up usually will have to be on a sample of former trainees. It should be designed to find out from the individuals concerned, and their immediate supervisors, whether or not their performance has improved and if they are satisfied with their working conditions. Interviews with former participants provide an opportunity to reinforce the earlier training and perhaps to provide information and opinions helpful to improving future training activities.

In order to facilitate follow-up and to provide a sound basis for monitoring career development, it is important that the human resource information system of the personnel unit include records of all training events attended by each person in the department.

Periodically, at intervals of two to five years, it is advisable to evaluate the whole training program of the department. The methodology can be quite similar to that suggested for a Training Needs Assessment. In addition, it would be useful to assess the quality and amount of training material developed for and through the various training events in the preceding period.

Next Steps

To establish a strong training program along the lines envisioned here, each interested country could start with a workshop on the operations and maintenance of irrigation schemes under the auspices of the national central planning organization from which some recommendations on human resource development should emerge. This could lead to a small national workshop on the topic at which all agencies concerned with irrigated agriculture would be represented. The purpose of such a meeting would be to:

- Identify strategic concerns and issues in the irrigation sector;
- Identify and assign relative priority to issues and proposed actions;
- Review the current status of training within all agencies or departments who are concerned with irrigated agriculture regarding the priorities identified;
- Identify areas where performance can be improved through training; and
- Agree upon a plan of action to develop a detailed training strategy.

Annex D provides further suggestions on topics that might be included in a national workshop on training for irrigated agriculture.

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Annex A

National and International Institutions with Expertise in Irrigation Training

Irrigation training is available from a wide range of sources. This annex comprises a list of some national and international institutions which have made their services available to strengthen irrigation training in developing countries.

Argentina

- Centro de Economía, Legislación y Administración de Agua (CELA) del Instituto Nacional de Ciencia y Technología Hídricas (INCYTH)
  Casilla de Correos 589
  Belgrano Oeste 210
  5500 Mendoza
  Telex: 55110 INCRA AR
  Telephone: (061) 24 18 33

Australia

- Centre for International Irrigation Training and Research (CIITR)
  University of Melbourne
  217 Royal Parade
  Parkville Victoria 3052
  Telex: AA35185 UNIMEL
  Telephone: (613) 344 4512
  Facsimile: (613) 348 1524
- Murrumbidgee College of Agriculture
  Yanco 2703
  NSW Australia
  Telephone: (069) 53-02-96

Bolivia

- Departamento de Recursos Hídricos
  Corporación de Desarrollo de La Paz (CORDEPAZ)
  C./Arce esq. Pinilla, La Paz
  Telephone: 36 73 19

Brazil

- Ministerio da Irrigaçao - PROINE
  Edifico CODEVASF . SGAN 601 Lote
  70830 Brasilia D.F.
  Telephone: (061) 225-9455

Canada

- Macdonald College of McGill University
  Ste. Anne de Bellevue
  Quebec H9X 1CO

Chile

- Division de Recursos Renovables
  Servico Agricola y Ganadero (SAG)
  C./Bulnes, 140

4088 Santiago
Telephone: 72 16 72; 71 83 76

China

- International Research and Training Center on Erosion and Sedimentation (IRTCES)
  P.O. Box 366
  Beijing
  Telex: 22786 IRTCES
  Telephone: 89 33 72

Costa Rica

- Servico Nacional de Aguas Subterraneas, Riego y Avenamiento (SENARA)
  Apartado 5262 San Jose
  Telephone: 33 07 28

Dominican Republic

- Departamento de Distritos de Riegos del INDRHI
  C./Comandante Jimenez Moya
  Sector La Feria
  Santo Domingo
  Telex: 3460559
  Telephone: 532 3271, 533 5383, 533 0455

Ecuador

- Instituto Ecuatoriano de Recursos Hidraulicos (INERHI)
  C./ San Juan Larrea 534
  Quito
  Telephone: 540 501

Egypt

- Water Research Center
  22 El Galaa Street
  Cairo
  Facsimile: (202) 77 36 78
  Telex: 20275 UNWRC
  Professional Development Project
  Irrigation Building
  Fumel Ismailya
  Kalfawi Post No. 1161
  Shubra El Mazalat
  Cairo 946855
  Telephone: 220 3037/8

France

- International Training Center for Water Resources Management (CEFIGRE in French)
  B.P. 13
  Sophia Antipolis
  06561 Valbonne Cedex
  Telex: 461 311 F
  Telephone: 93 65 49 00

India

- Central Board of Irrigation and Power
  Malcha Marg, Chanakyapur
  New Dehli, India 110021
  Telex: 81-31-66415
  Telephone: 91-113015984

Israel

- Agricultural Research Organization
  The Volcani Centre

International Courses
P.O. Box 6
Bet Dagan 50250

Japan

- Tsukuba International Agricultural Training Centre (TIATC)
  Japan International Cooperation Agency (JICA)
  No. 3 - 7, Koyadai, Tsukuba - Shi
  Ibaraki - ken, 305, Japan

Mexico

- Director General de Irrigación y Drenaje
  Secretaria de Agriculture y Recursos Hidraulicos
  Avenida Nvo. Léon, 210-1
  06170 México D.F.
  Telephone:

Morocco

- Centre International de l'Irrigation
  IAV Hassan II
  BP 6202
  Rabat-Instituts
  Rabat
  Telex: AGROVET 31873 M
  Telephone: (212) 717-58/59

Nepal

- International Irrigation Management Institute (see Sri Lanka)
  P.O. Box 3975
  Kathmandu

Netherlands

- Institute for Land Reclamation and Improvement
  c/o Director IAC
  P.O. Box 88
  6700 AB Wageningen
  Telex: 45888
  Telephone: (0) 8370-9011
  Facsimile: (0) 8370-18552

Peru

- Instituto Nacional de Desarrollo (INADE)
  Camino Real, 355
  San Isidro, Lima
  Telex: 21142 PE
  Telephone: 40 02 25

Philippines

- International Rice Research Institute
  P.O. Box 933
  Los Banos, Laguna
  Manila
  Telex: 40890 RICE PM
- ISMIP, College of Engineering
  Central Luzon State University
  Munoz, Nuevo Ecija 3120
  Telex: 27677 IMC PH
  Telephone: 107
- NIA, Government Building
  EDSA

Quezon City, Philippines
Telex: 42802 (NIA PM)
Telephone: 96-15-93

Spain

- (IRYDA)
  Paseo de Castellana, 112
  28046 Madrid
  Telex: 48979 IRDA E
  Telephone: 581 6178

Sri Lanka

- International Irrigation Management Institute
  Digana Village
  Via Kandy
  Telex: 22318 IIMIHQ CE
  Telephone: (08) 74274

Thailand

- Continuing Education Center
  Asian Institute of Technology
  G.P.O. Box 2754
  Bangkok, 10501
  Telex: 84276 TH
  Telephone: 529-0100-13
- Civil Service Training Institute
  Thanon Pitsanuloke
  Bangkok 10300
  Telex: CIVICOM
  Telephone: 281-5020, 281-5606
- Faculty of Engineering
  P.O. Box 26
  Khon Kaen University
  Khon Kaen 40002
- O&M for Zonemen
  Royal Irrigation Department
  Samsen Road
  Bangkok 10300
  Telex: 72307 DEPROIR TH
  Telephone: 241-3057
- Irrigation Water Management
  O&M Training Branch
  Royal Irrigation Department
  Samsen Road
  Bangkok 10300
  Telephone: 241-3057
- Department of Irrigation Engineering
  Kasetsart University
  National Agricultural and Training Center
  Nakornpathom

U.K.

- BHRA, Cranfield
  Bedford, MK 43 OAJ
  Telex: 825059
  Telephone: (0234) 75 04 22
- Development and Project Planning Centre
  University of Bradford
  Bradford BD7 1DP
  West Yorkshire, England
- Silsoe College
  Bedford MK45 4DT
  Telex: 265871 (MONREF G) EUM 300
  265451 (MONREF G) EUM 300
  Telephone: (0525) 60428
- Hydraulics Research Limited
  Wallingford, Oxfordshire
  OX10 8BA, U.K.
  Telex: 848552 HRSWALG
- Institute of Irrigation Studies
  University of Southampton
  Southampton S09 5NH
  Telex: 47611
  Telephone: (0703) 55 91 22

U.S.A.

- Arizona-Sonora Field School
  2201 N. Indian Ruins Road
  Tucson, AZ 85715
  Telex: 825867
  Telephone: (606) 722-9798
- Center for International Programs
  New Mexico State University
  Box 30001
  Las Cruces, New Mexico
  Telephone: (505) 646-4735
  Facsimile: (505) 646-1517
- International Center for Water Resources Management
  Benneker Hall, Room 103
  Central State University
  Wilberforce, Ohio 453884
  Telephone: (513)376-6153
- International Water Resources Association
  University of Illinois
  205 North Matthews Avenue
  Urbana, Illinois 61801
  Facsimile: (217) 333-8046
  Telephone: (217)333-6275
- Irrigation Association
  1911 North Fort Myer Driver
  Suite 1009
  Arlington, Virginia 22209-1630
- Irrigation Center
  Staples Technical Institute
  Staples, Minnesota 56479
  Telephone: (218) 894-1051

- United States Bureau of Reclamation
  P.O. Box 25007
  Denver, Colorado 80225
  Telephone: (303) 236-8099

- University of Nebraska WC
  Research and Extension Center
  Route 4
  Box 46A
  North Platte, NE 69101-9495
  Telephone: (308) 532-3611

- American Water Foundation
  P.O. Box 15577
  Denver, Colorado 80215
  Telephone: (303) 236-6960

- Colorado Institute for Irrigation Management (CIIM)
  Agricultural Engineering Department
  Colorado State University
  Fort Collins, Colorado 80523
  Telex: 910 9309011
  Telephone: (303) 491-2868

- International Irrigation Center
  Utah State University
  Logan, Utah 84322-4150
  Telex: 3789426 UTAH STATE LOGAN
  Telephone: (801) 750-2800

Venezuela

- Centro Interamericano de Desarrollo Integral de Aguas y Tierras (CIDIAT)
  Parque de la Isla
  Edif. CIDIAT
  209 Merida
  Telex: 74104 CIDIA VC
  Telephone: (074) 44 06 47, 44 14 61

Yugoslavia

- Institute of Field and Vegetable Crops
  Faculty of Agriculture
  University of Novi Sad
  M. Gorkog 30
  21000 Novi Sad

Annex B

Preparing and Conducting Training Needs Assessments for Irrigated Agriculture

Training needs assessments (TNAs) are a structured way to analyze the training needs in relation to the objectives and targets of an irrigation department. Information from a TNA forms the basis of a department's plans for relevant and cost-effective training. This annex describes the seven steps which comprise the TNA methodology and provides some suggestions as to how it can be implemented. In some cases it may be useful for "Step 3" to come first if help is required on the first two steps.

Step 1. Define performance shortcomings.

When an organization analyses the performance of its managers and staff to determine the extent of shortcomings between expected and actual performance, it has undertaken the first and most important step in a review process leading to an overall assessment of its training needs. Some of these shortcomings may be addressed through training, but not all of them (see Step 2 below).

Measures of performance include indices relating to output and to performance of personnel at all levels. Output indices may be area-based measures of land benefited from irrigation, comparative yield data, or in some cases indices of rates of water supplied from various points in the canal network. Where water measurement data are reasonably reliable, they provide a strong basis for assessing performance shortcomings because water supply is a direct responsibility of irrigation personnel; crop yields are indirect. Other indices, such as time and cost to complete projects in relation to planned time and cost, may also be used.

Personnel indices include rates of absenteeism, the nature and number of personnel disputes, and the extent to which staff act on behalf of the organization. Both quantitative measures and qualitative judgments of supervisory and management personnel may be used. In either case, senior management must evaluate the degree to which the information characterizes the organization as a whole before accepting and acting upon it.

Step 2. Determine the degree to which the shortcoming can be resolved by training.

Once performance shortcomings have been identified or changes in performance criteria have been decided, an initial decision has to be made regarding the probability that training, alone or in combination with other improvements, is an appropriate solution. This can be facilitated by locating the management or staff level and source of each of the shortcomings. For most irrigation organizations, shortcomings may occur at the individual, function, institution, and policy levels. Sources of shortcomings may occur at any of these levels, and may result from gaps in mastering the management or technical skills, lack of motivation, or the environment of the job. These sources are elaborated and illustrated below.

- Some shortcomings are at the *institutional* level affecting the operation of the department as a whole; examples of these may be found in personnel management problems or counterproductive division of responsibility. To resolve these cases, a management

restructuring may be required in which training has only a complementary role, since workshops may be useful to design and to introduce the new structure of the organization.

In these situations, the department should be analyzed and new objectives set for those functions that are not being performed satisfactorily. Only when it can be clearly stated who will carry out the individual responsibilities of an organization, and at what levels of proficiency, can current skill levels be assessed and training needs defined precisely.

- If the performance shortcoming can be traced to the *individual* level and is due to a *lack of management or technical skills*, direct training may be an appropriate remedy and an assessment of the training needs of these individuals should be carried out. An example is the finding that field staff are not measuring water as directed at various offtake points; a refresher course in water measurement might solve this problem.

But other possibilities should also be considered, such as whether or not the staff had ever been properly exposed to water measurement; the measuring structures are fully functional; the staff's original or induction training was sufficient, or the recruitment and selection process brought the right individuals in to the department. The judgment that water measurement is an appropriate skill should also be confirmed before launching a refresher course in that subject, because many irrigation systems today are operated in the absence of water measurement.

- If the shortcoming can be traced to a department's *functions*, its remedy is likely to involve several management and staff levels and a combination of technical and clerical skills. Two examples of such shortcomings are the below-target collection of water user fees levied in most countries, and rapid depreciation of construction equipment.

These examples reflect the fact that many shortcomings at the function level result from management weaknesses or inconsistencies, the solutions to which may involve significant training activities. But changes in organizational procedures, either in conjunction with the training or separately, may be even more important.

- Shortcomings resulting from the *relationship between an irrigation department and its external environment* are least amenable to training solutions. Examples of these issues are salary structures set by national authorities and the relationships among the various agencies concerned with irrigated agricultures. These shortcomings are difficult to resolve through training because they cannot usually be reduced to specific operational tasks, functions, or skill gaps. However, it may be useful to arrange an inter-institutional workshop to develop a consensus on how to resolve the issue.

Step 3. Select "assessors" for the TNA.

Senior management must decide who will carry out the TNA. It may be done by the department's internal training or personnel unit, a similar unit from a local university or faculty of public administration, or by external management and training consultants. In all cases, line managers and user groups should be included. Internal assessors are familiar with the department and with the subtle but important reasons why it performs the way it does. External people have an advantage in independence of judgment and are less influenced by internal politics than internal assessors; however, it is important that they should be neutral and not suppliers of training. In either case, however, those carrying out the assessment must have clear authority from senior management to observe how field and office staff do their jobs, to interview managers and staff, to convene meetings, and to have direct access to all relevant internal reports and personnel records.

Step 4. Set performance and skills standards for key managers and staff.

After identifying those activities and positions which require the improvement, assessors and senior management should then set standards of competency which, if met by staff, will ensure performance in key jobs at levels acceptable to management. In doing this, it is important to set realistic targets which can be achieved by the bulk of managers and staff

with reasonable training, rather than very high or ideal targets which are not likely to be met by many of them.

This step is much easier if job descriptions are already available for the examined positions. Job descriptions serve as a standard against which staff may be evaluated. If they are not available, the TNA can still be carried out using standards similar to job descriptions against which to assess the performance of staff. The long-term aim should be to integrate performance evaluation with job descriptions.

Step 5. Draw profiles of the skills proficiency of key staff.

If the organization has reasonably complete personnel records or an inventory of staff skills, it is not too difficult to prepare a profile of the current skills proficiency of key staff. If this information is not available, it will have to be generated by the TNA assessors. This can be done through surveys of a sample of staff in each position, and is one of the most time-consuming parts of the TNA; however, it is possible to use the "nominal group technique" to speed up this stage of work (see below). At this stage it may be useful to make an evaluation of critical tasks, as outlined in Figure 1.

Step 6. Define the gaps in skills of key managers and staff.

The gaps are the differences between the performance and skill standards (Step 4) and current skills proficiencies (Step 5).

Step 7. Determine which personnel to train and on what subjects.

Different types of training are appropriate for various levels of managers or staff and for different performance problems. This can be visualized as a range of training with different degrees of priority:

Priority 1. Those activities which should be strengthened as quickly as possible, for example, to prevent damage to canal structures, or to achieve a target irrigation schedule during a season. Normally this training takes the form of on-the-job or refresher training for personnel who already possess many of the required skills.

Priority 2. Performance shortcomings which do not require immediate intervention, or those resulting from a shortage of qualified personnel will probably involve specialist training at a location outside the department.

Priority 3. In every organization there are managers and other staff whose performance is not likely to improve as a result of training, and who are not eligible for specialist training. These people possibly may, however, be re-trained to carry out a different set of jobs.

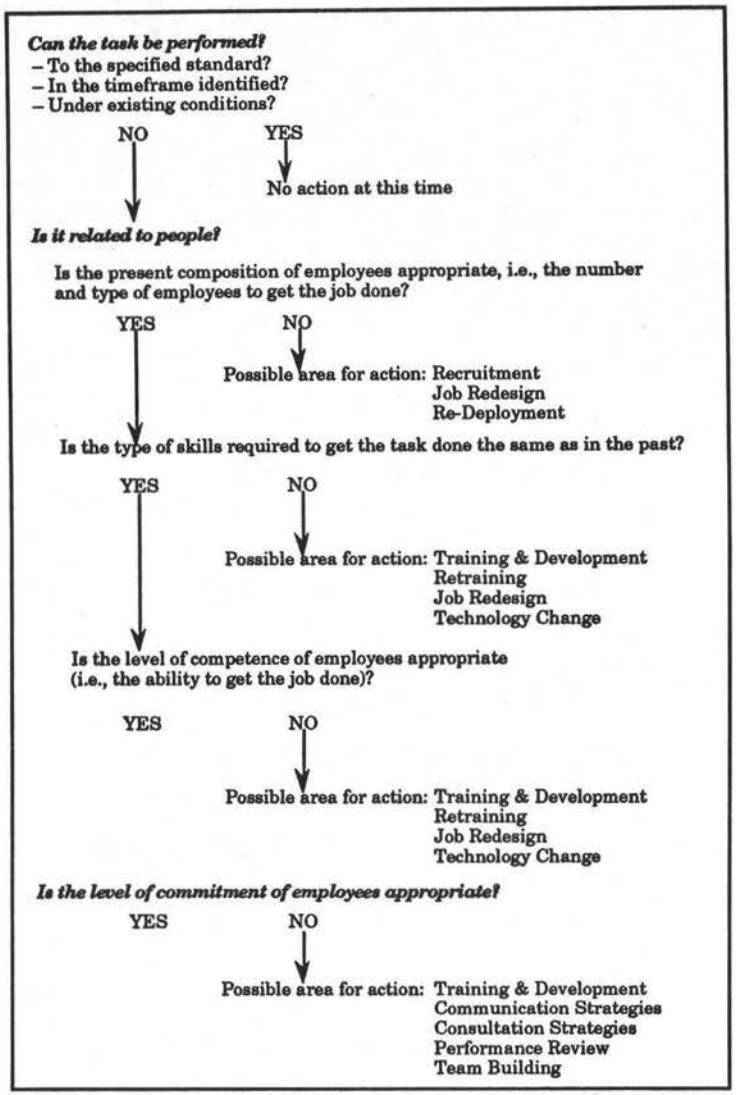
Nominal Group Technique (NGT)

The NGT is a decisionmaking strategy which is designed to help generate a maximum input from group members while limiting unconstructive personal conflict within groups. One of its major features is the way it regulates group inputs and decision selections, limiting opportunities for conflict by structuring the steps in the decision process. The process also ensures that each participant has an equal chance to contribute. The sequential steps in NGT are as follows:

- Silent generation of ideas in writing;
- In turn feedback from group members to record each idea in a brief phrase on a flip-chart;
- Discussion of each recorded idea for clarification and understanding; and
- Individuals voting on the relative priority of ideas with the group decision being mathematically derived through rank-ordering or rating.

Although this technique is commonly used as a decisionmaking procedure, it can be modified for use in diagnosing and analyzing training needs.

Figure 1. Evaluation of Critical Tasks



Diagnostic Meetings

To begin the process, natural work groups within the department should be identified. Each of these groups must consist of up to 15 persons. Care should be taken to ensure that all participants in each meeting are at the same organizational level and have similar duties and responsibilities. The process can be broken down into three distinct phases.

Phase 1: Nominal Grouping

The meeting for each of the natural groups should start with an introduction by a senior manager and the staff development officer. Each of them should emphasize that the purpose of the meeting is to identify problems in the organization which were inhibiting efficiency so that they could be corrected through training possibly combined with administrative changes. The group would be asked to provide open and honest input by simply listing on paper all of the problems which they perceived in their unit and in the department in general. After the problems are listed and clarified, the participants should be thanked for their input and informed that methods and procedures for resolving the issues would be developed in later meetings. This entire process may last for no more than an hour for each group.

After these initial diagnostic sessions, the data should be summarized and collated according to the natural groupings within the department. It is quite usual to generate something in the order of 700 to 800 problems in a department. These may range from simple things, such as the inadequate lighting in staff areas, to more complex issues, such as the inability to operate sophisticated machinery.

Phase 2: Rating

This phase concerns rating and assignment of priority to the problems identified in the first phase. Again natural groups should be formed representing the work areas in which unit problems have been identified. The groups should be given a list of all the problems relevant to their unit and asked to rate the importance, priority, and safety of each problem on a 10 point scale. In addition, they should be asked to mark either or both of two columns to indicate if the problem was caused by a performance or knowledge deficit. During the meeting, each of the categories should be carefully defined before the rating process is begun. The definitions are as follows:

Importance. This category refers to the degree to which this problem affects the quality of the department. Ask yourself: Will solving this problem noticeably improve the quality of the department? If so, give the problem a rating at the upper end of the scale, or vice versa.

Priority. This rating has to do with the degree to which you believe you can do something about the problem. If you believe the problem is the management's or someone else's, give it a low rating. If you believe you can make a contribution to solve the problem, give it a high rating.

Safety. If this problem threatens the life or health of any of the population, give it a "yes"; if not, give it a "no."

Knowledge. If this problem is attributable to a lack of knowledge, information, or training, give the problem a "yes." There is need for care on this one. Ask yourself: Would the employee be able to correct the problem without additional training, if their life depended on it? If the answer is "yes," the problem gets a "no" rating.

Mechanical. If this problem is mechanical or structural rather than a lack of ability or information, give it a "yes" rating. Give it a "no" rating if it cannot be corrected until a piece of equipment or structure is repaired or redesigned.

It normally takes groups 30 to 45 minutes to complete their ratings.

After the ratings have been completed, the data should be collated and tabulated for each unit of the department. The mean scores in the rating categories for priority, importance, and knowledge should be totalled in order to determine the most critical problem areas.

Phase 3: Action Planning

The final diagnostic phase consists of action planning with the natural work groups. Two major things should happen in these sessions.

First, a senior manager should summarize all the high priority items for each group and indicate managerial actions to be taken in order to resolve issues. Second, the natural work groups should analyze and discuss the remaining problems. Task forces may be established, some of which may include several natural groups. These task forces should return at a later date with action plans to alleviate problems.

An important outcome of these action plans is generally to improve standard operating or administrative procedures. In addition, specific training programs may be designed or arranged with suitable providers and other qualified personnel to help solve the technical and organizational problems.

Annex C

Systematic Training Programs: An Indicative List of Categories of Staff and Their Requirements

Examples of the main skills required by staff at various hierarchical levels and broad occupational groupings include the following:

1. Senior Managers
   - Corporate Planning
   - Strategic Planning
   - Leadership Skills
   - Organization Planning
   - Economic Evaluation
   - Financial Planning
   - Interpreting Government Policies and Procedures
   - Management of Change
   - Communication
   - Negotiations with Other Agencies
   - Staff Motivation
   - Presentations to Boards and Ministers
   - Media and Public Relations

2. Middle Managers
   - Communication
   - Motivating Staff
   - Industrial Relations Negotiations
   - Personnel Management
   - Leadership
   - Supervising Staff
   - Decisionmaking
   - Report Writing and Presentation
   - Controlling Budgets
   - Contract Administration
   - Identifying Information Needs
   - Information Management
   - Preparing Budget Estimates
   - Occupational Health and Safety

3. Supervisors
   - Job Descriptions
   - Supervising Staff
   - Motivating Staff
   - Site Supervision
   - Performance Appraisal
   - Leadership
   - Communication
   - Instructing Staff in New Roles

- Resolving Conflict
- Occupational Health and Safety

4. Professional Technical
   - Cost Estimating
   - Report Writing and Presentation
   - Construction Methods
   - Project Networking (scheduling)
   - Site Supervision
   - Design of Water and Drainage System
   - Irrigation Scheduling
   - Preparing Budget Estimates
   - Analyzing Social, Economic, and Technical Information
   - Project Documentation
   - Identifying Information Needs
   - Developing Efficient Operating Systems

5. Professional Commercial and Business
   - Financial Planning
   - Preparing Budget Estimates
   - Auditing Expenditure
   - Basic Accounting
   - Report Writing and Presentation
   - Financial Planning
   - Maintaining Information Systems
   - Identifying Information Needs
   - Current Cost Accounting
   - Instructing Staff in New Roles

6. Administration/Clerical
   - Handling Repetitive Work Loads
   - Preparing Position Descriptions
   - Communications
   - Clerical and Administrative Skills

7. Technician
   - Using New Equipment
   - Communication
   - Motivating Staff
   - Handling New Materials
   - Site Supervision
   - Instructing Staff in New Roles
   - Leadership
   - Mobile and Fixed Plant-Operations and Maintenance
   - Occupational Health and Safety

8. Operator
   - Irrigation and Drainage Systems Operation and Maintenance
   - Multi-skill Capabilities
   - Handling Repetitive Workloads
   - Mobile and Fixed Plant Operation

Annex D

Some Topics for a National Workshop on Training for Irrigated Agriculture

- List the areas of *performance to be improved.* As not all areas will be amenable to a training approach, the participants to this meeting will need to decide their relative priorities and the specific areas which require additional "needs analysis" (Annex B). Without prejudicing the results of a needs assessment, some of the skills which might be considered are listed in Annex C;
- Establish current *linkages between the priority areas of need, the management of the department, and the broader institutional and political environment.* Identify the ancillary activities needed to ensure that training is likely to have the intended impact. Some of these factors may need concurrent (or even prior) attention if the projected training is to play its intended role in improving performance;
- Describe the *manpower available* to perform the broad range of functions and tasks associated with irrigated agriculture. If this information is not immediately available by staff levels, or is not in as accurate and up-to-date a form as possible, the information can be collected as part of a Training Needs Assessment (TNA), and this will form the basis for a personnel inventory;
- Plan and schedule the *administration of a TNA.* Decide if the TNA will be conducted entirely by staff of the department concerned or with help from external training consultants. If the latter are required, decide on the consultants' terms of reference (for example, how narrow or broad the scope of work, how much access to top management, and which internal unit will be responsible for monitoring the progress?); and
- Organize the *analysis and review of data from the TNA.* Decisions will be made by members of the TNA team on who will conduct the analysis and on how much detail will be required as a result. Will analysts be expected to define the most appropriate alternative training strategies, given the range and intensity of staff needs? How detailed must the report be in describing curricula and training material for the proposed specialized and management training? How much time and money must be provided for the proposed training? How best to ensure that well focused training is permanently part of management strategy and plays an important part in the development of all staff careers?

On the basis of such a workshop, the national department and related agencies might designate a small team of senior officials to plan how it will approach the issue. That team should review the guidelines of Chapter 5 in preparing a strategic plan for staff training.

Annex E

An Example of a Mission Statement: The Rural Water Commission of the State of Victoria, Australia

Statutory Functions of the Rural Water Commission

These are set out by order in Council:

- to provide water and water-related services for irrigation, domestic, and stock uses and for commercial, industrial, recreational, environmental, and other beneficial uses in irrigation and other rural areas throughout Victoria;
- to design, construct, operate, and maintain the necessary infrastructure to enable the delivery of services;
- to allocate and sell water and where necessary purchase water and implement pricing and demand management policies;
- to undertake resource assessment and investigations pursuant to the effective and efficient operation and maintenance of rural water services;
- to undertake water services and related functions as may be assigned by legislation, directed by the Minister or delegated to the Commission by other public authorities; and
- to develop public education programs to promote broad community awareness of the roles of rural water services in Victoria's social and economic development.

In the exercise of its functions the Rural Water Commission shall pursue the following objectives:

- to manage the water resources and water-related land resources entrusted to the Rural Water Commission in ways which are most beneficial to the people of Victoria;
- to provide water services for irrigation, stock, domestic, industrial, commercial, recreational, environmental, and other beneficial uses to the extent and to standards determined by the government after consultation by the Rural Water Commission with the recipients of those services;
- to provide its services efficiently and economically;
- to provide a working environment which is safe and satisfying;
- to charge for its services with a view to recovering the cost of providing those services less any subsidy provided by the government; and
- to provide its services in a socially and environmentally responsible manner and in consultations with the appropriate authorities.

Mission Statement and Objectives of the Rural Water Commission

The Rural Water Commission's Mission Statement and Objectives have been developed from the statutory functions and objectives, emphasizing in particular our drive towards achieving the business goals while maintaining levels of service to customers.

Mission Statement:

The Rural Water Commission is a public business authority whose primary mission is to sell water and water-related services for irrigation, domestic, and stock uses and for commercial, industrial, recreational, environmental, and other beneficial uses in rural areas throughout Victoria.

Objectives:

- Services provided by the Commission should satisfy customer needs, be consistent with the statutory powers and responsibilities of the Commission, and be at a level agreed to by the minister.
- Revenue earned should equal the full cost of services. The cost of satisfying the obligations of the Commission to the state in managing the natural resource of water and water-related lands should be an integral component of the cost of providing these services.
- Services should be carried out at minimum unit and overall cost to the Commission.
- Services should generate a positive cash flow which is available for such things as reinvestment in the business and debt repayment.
- Capital projects should aim to earn a target rate of return based on the long-term weighted average cost of capital.
- Long-term financial viability for the business.

In order to achieve these objectives, the Commission places emphasis on the following characteristics in all activities:

- operating in a socially and environmentally responsible manner;
- an orientation towards the needs of the people it serves;
- recognition that organization performance is determined by the effort of each of its staff;
- demonstrated efficiency and effectiveness;
- high levels of accountability;
- flexibility and responsiveness to changing requirements; and
- provision of a work environment that is safe and satisfying.