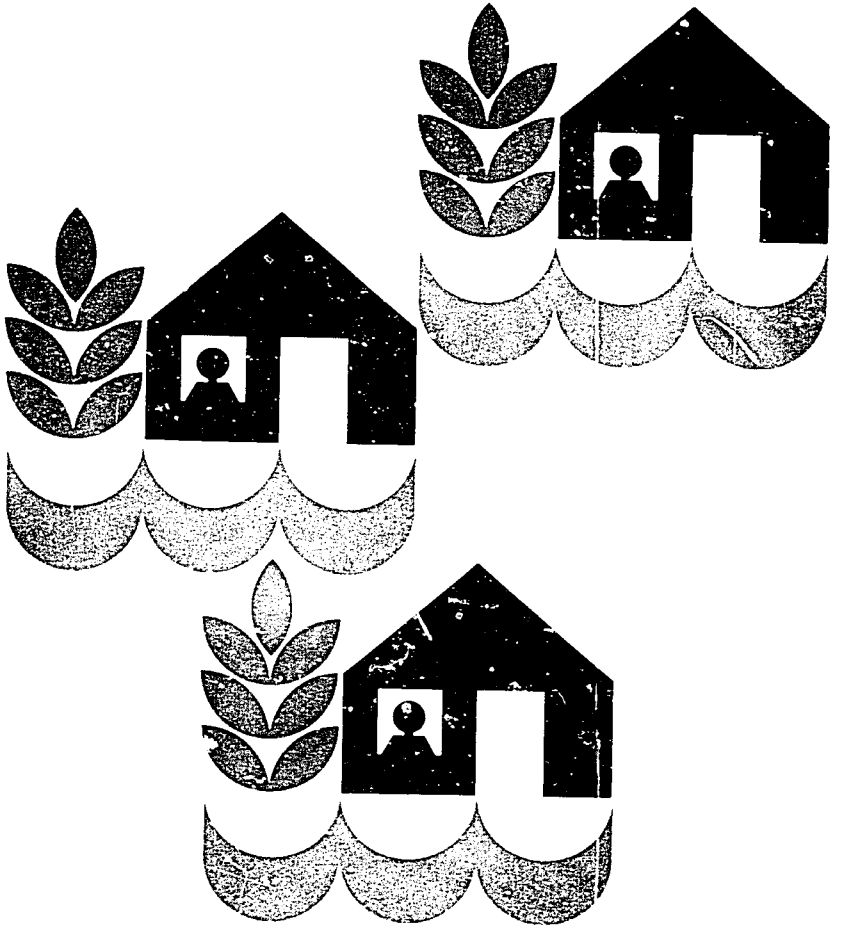
DIAGNOSTIC ANALYSIS WORKSHOP

Water Management Synthesis Project



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Diagnostic Analysis Workshop

Water Management

Synthesis Project

Introduction

A workshop called "Diagnostic Analysis of Farm Irrigation Systems" is one of several activities conducted by the Water Management Synthesis Project. This professional development workshop was created at Colorado State University using the concepts and experiences obtained from water management programs in Pakistan, Egypt, and several other Asian countries. The workshop is designed to be carried to countries throughout the world. It provides a hands-on approach to the understanding of the operation of irrigation systems whether they be modern delivery systems, surface irrigation systems, small pumping systems or human and animal powered systems.

The information provided in this booklet briefly describes the diagnostic analysis training course and its benefits.

A major thrust of the course is to develop personnel who can work with farmers to improve existing irrigated crop production practices.

Importance

Irrigation systems around the world typically operate at much below the designed level of performance. Investments to improve systems are often made because of the enormous potential for improvement.

The logical basis on which to improve the operation of any irrigation system is to first have a thorough understanding of how that system operates. The purpose of "Diagnostic Analysis of Farm Irrigation Systems" is to learn how to analyze an irrigation system through field investigations and understand how that system operates.

The design of the course consists of an interdisciplinary team study of an operating irrigation system. Physical measurements of the allocation and use of water and the crop production practices are made to determine what the actual operating conditions of the system are. Concurrent measurements of the socio-economic conditions are made to explain why these conditions exist. Working together, the team gains an understanding of the operation of the irrigation system, consisting of what is happening and why it happens. This provides an effective basis on which to design improvements for the irrigation system.

An important emphasis of the study is that a diagnostic analysis of problems must be based on data documenting the operation of the system and not on previous knowledge or experience, disciplinary interests, or assumptions about the system.

One of the trainers illustrates the effect an improved watercourse will have on cotton production.

The interdisciplinary team discusses irrigation problems with the farmers in an initial visit to a region.

Understanding of how and why a system operates at present is the best basis on which to design improvements. Improvements can be selected that solve priority problems and that produce major benefits to the farmer and to the system. Solutions to irrigation system problems not based on knowledge of the operating system frequently create more problems while not solving the real problem.

Major problems of energy, food production, environmental degradation, resource conservation and improvement of human well-being require expeditious solutions. Successful improvements of irrigation systems can provide a significant impact on these urgent problems.

Knowledge and skills in the diagnostic analysis of on-farm irrigation systems are of continuing value. Once constraining problems have been determined for the operating system, improvements for the system can be designed and tested.

Monitoring of improvements is necessary to verify the feasibility of each improvement. When successful solutions are implemented in an area, monitoring provides the basis for justifying and continuing the investment. Once initial priority improvements of the system have been made, further improvements of the system can be made by the same process.

Objectives

The program seeks to accomplish the following objectives with the help of cooperating host country personnel:

- Understand the principles, procedures and skills to identify the major water management problems on irrigation projects.

- Gain experience in conducting an actual field study and learn how to work together as an evaluation team.

- Develop knowledge and experience within the participant's discipline.

- Provide a basis for continued monitoring and improvement of an irrigation system.

The principle of the course is to train participants to be able to help farmers improve existing irrigated crop production.

Surveying watercourses is one of the skills participants must develop in the field.

Value

This training course is being developed to teach host country personnel how to conduct necessary field studies of the irrigation system.

The training concept has evolved from years of experience in on-farm water management programs in Pakistan, Egypt, and other countries. In Pakistan major problems were identified by a careful study of the irrigation system. After much research and development in Pakistan, irrigation improvements evolved informally. At present, Pakistan is investing several hundred million dollars in a farm water management improvement program.

In Egypt,a similar program was begun in 1977. A major portion of the project there has been identifying the key constraints in the irrigation systems. There, for example, problems of unlevel land, inequitable distribution of water and poor cropping practices were found to be the principal constraints to improved agricultural productivity. Solutions to these problems have now been tested and a development program is evolving.

The basis for both country programs was an analysis of the management within the existing irrigation systems.

Above is a watercourse before it has been improved. Weeds and silt along with narrow banks have contributed to overtopping, seepage and consequent loss of water.

Here is the same watercourse after it has been improved by farmers using technicians' advice on the correct width and depth of banks, removing silt, weeds and roots, and compacting the soil in and around the watercourse. The watercourse can now deliver more than twice as much water to the fields as before.

Participants discuss upcoming field activities.

Training Description

The course is a blend of theory and practice. The theoretical part of the training includes understanding of a diagnostic analysis of an irrigation system including learning interdisciplinary systems analysis, and developing certain disciplinary concepts.

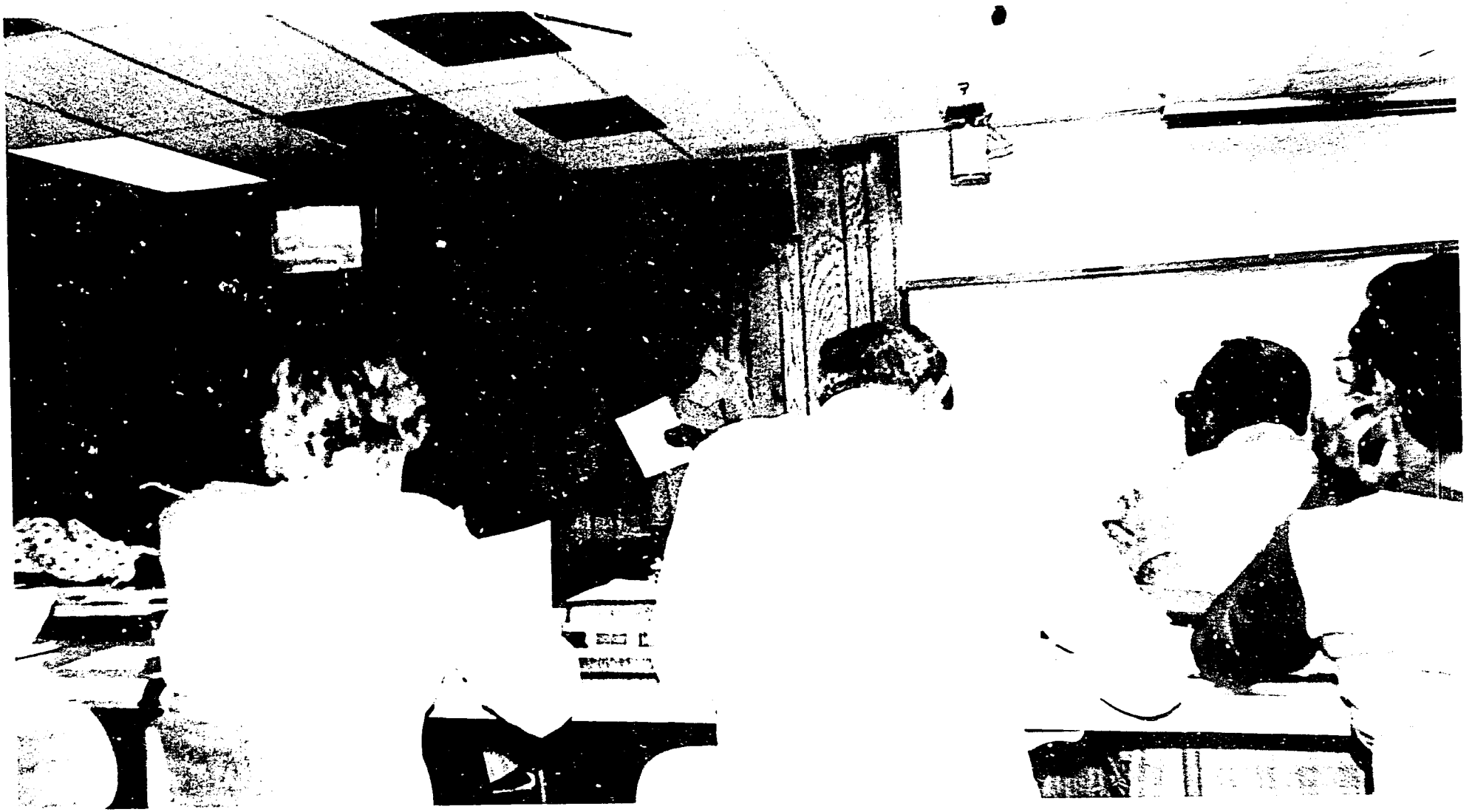
The emphasis of the study, however, is on learning by doing.

The training exercise not only contains theory about water management, but also involves the participants in a field study to identify the major problems within their irrigation system.

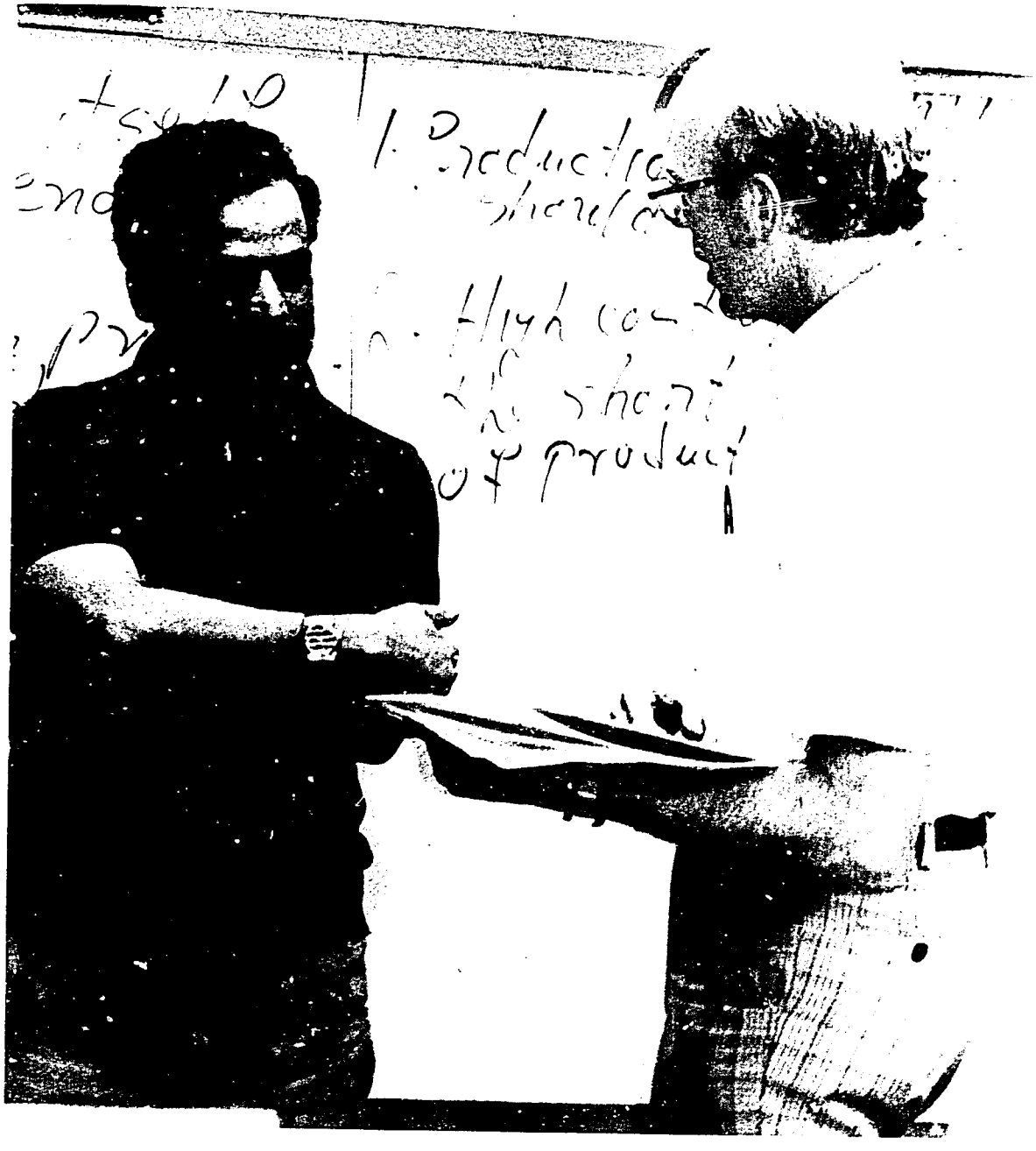
Participants identify major irrigation constraints through an actual field study of an irrigation system in a particular region.

Data analysis and interpretation give the participants experience in report preparation and communication. The product of the training is an important evaluation of the major constraints to increased agricultural productivity caused by poor water management practices.

Technical knowledge, along with a willingness to work together as an evaluation team, are essential to the success of the program.



Understanding that the irrigation system is not an isolated water delivery system, but is also affected by the culture, the economic situation, agronomic practices, and other important inputs to the total system is an example of the theoretical base needed and taught in the course. Here the classroom is being used to discuss theory.



Here is a session led by an economist who is showing the impact economics have on farmer decision making about irrigation practices.

Course Request

The training course is tailored to an individual country's needs. The workshop is initiated by a request from a particular country through the Agency for International Development. Once the request has been granted, a team from the Water Management Synthesis Project visits the country to lay the groundwork for the workshop. During the one to two week visit, the project team participates in selecting counterpart workshop leaders, participants, and guest lectures for the workshop. The team also assists the co-director in locating a field site within close proximity of a training facility.

Approximately two months prior to the workshop, the co-director and counterpart workshop leaders are invited to Colorado State University to plan the workshop in detail. During their two-week visit, the counterpart workshop leaders brief the project staff about the study site and participate in the development of a detailed schedule for the workshop.

The preliminary planning, both in the host country and at CSU, is considered to be crucial to the success of the workshop. All of the planning is directed toward the successful accomplishment of the workshop objectives.

Because most countries will require a large work force in water management personnel in the next decade, the development of counterpart workshop leaders is considered to be crucial to the continuation of the program. Their involvement as co-workshop leaders insures multiplication of the workshop concepts throughout the country.

Participants

The course of study is five weeks long. Preferably, about 20 technicians in engineering, agronomy, rural sociology or extension and agricultural economics are selected to participate. Participants range from those with bachelor's degrees to those with doctorates, but who are involved and have an interest in assisting farmers to improve agricultural production through better water management.

Instructors

The course is taught by faculty from universities in the western part of the United States that are part of the Consortium for International Development and assisted by host country trainers.

The Water Management Synthesis staff has had extensive experience in working in developing countries. It has participated with Egyptians in developing a training program. This training course has been taught the last five years as part of the Egyptian Water Use and Management Project sponsored by AID. The Water Management Synthesis staff has taught the course twice in India and once in Sri Lanka.

Participants are using a current meter to gauge water velocity — one of many techniques taught in the diagnostic analysis of an irrigation system.

Many of the necessary skills are learned in the field by actual on-site participation. This trainer is showing a participant how to gather data on loss of irrigation water from the farm delivery system by using a flume.

Course Description

The workshop begins with opening ceremonies in the host country. Usually, dignitaries from the host country greet the workshop participants, staff and visitors and a response is given by the workshop director.

The first week of activities is restricted to classroom instruction. Discussions and videotapes are used to provide the participants with an understanding of the philosophy and concepts of diagnostic analysis, to strengthen discipline skills and to initiate the development of interdisciplinary skills among the group.

Weeks two and three begin the actual field work. The concepts and procedures learned in the classroom are put to use in the field. Week two begins with a reconnaissance survey of the irrigation site selected for diagnostic analysis. During reconnaissance, each discipline walks through the irrigation system observing its operation and identifying the areas which will require more detailed investigation.

After reconnaissance, the workshop leaders work with each discipline to standardize the types and methods of data collection to be used in the detailed studies. Once the members of each discipline understand the types and methods of data collection required, detailed studies of the system are initiated.

OVERVIEW OF WORKSHOP ACTIVITIES

(Weekly Basis)

Week No.	Activities
1	Opening ceremonies. Interdisciplinary and disciplinary video tape lectures and discussions. Team building exercises. Irrigation project orientation lectures. Team selections.
2	Reconnaissance survey of the project area. Interdisciplinary detailed studies of selected watercourses (four teams, each assigned to one watercourse).
3	Interdisciplinary studies completed. Disciplinary and interdisciplinary report preparation. Oral presentations of interdisciplinary study results.
4	Interdisciplinary detailed studies on a second watercourse (four teams, each assigned to one watercourse).
5	Interdisciplinary studies completed. Disciplinary and interdisciplinary report preparation. Final interdisciplinary report preparation over both watercourses. Oral presentations of interdisciplinary studies. Closing ceremonies.

The agronomist investigates soil conditions, cropping practices, and crop conditions such as crop stands and yields to determine possible problems causing reduced yields.

The participants are divided into teams consisting of an agricultural economist, an extension sociologist, an irrigation engineer, an on-farm engineer, and an agronomist. Each 5-member team is assigned a field channel for a 6-day detailed study. The team assignments are positioned so that each team occupies a unique position on the irrigation system. Each team is provided with a set of maps detailing the topography, soils, irrigation system and field layouts of their study sites. With the aid of maps, each team plans the data gathering activities required to describe the operation of the irrigation system and to identify the positive and negative aspects affecting its operation.

Team members attempt to collect information on the operation of the system. Each discipline is responsible for collecting data related to the physical, biological, and socio-economic aspects of the system. The data gathered by the team is used to prepare a set of disciplinary reports and an interdisciplinary team report detailing systems operation on their particular study site. In addition to the reports, the teams are asked to provide an oral presentation of their findings. The presentations provide each team with a better understanding of the overall operation of the irrigation system.

The fourth week of the workshop is spent conducting a second detailed study. Teams are assigned to a different set of field channels. During week five the teams prepare disciplinary and interdisciplinary reports on the outlets they studied. In addition, each team prepares an overall interdisciplinary report describing the operation of the system using the results of their study of both outlets.

The interdisciplinary teams plan their activities before going into the field.

Co-workshop leaders make final changes on the workshop reports. These reports will be delivered to government organizations that are involved with irrigation water management in the host country.

At the completion of the workshop, the participants are awarded a certificate indicating the successful completion of the 5-week workshop. It is given at the closing ceremony in recognition of the participant having achieved skills in diagnostic analysis.

About four weeks after the workshop is over, the reports and data collected by the interdisciplinary teams are brought to Colorado State University where the co-workshop leaders prepare comprehensive disciplinary and interdisciplinary reports on the project. These reports, when completed, are sent to the respective government organizations within the host country.

Major Benefits

The workshop provides participants with water management skills to diagnose systematically the major constraints to improving irrigated agriculture. It provides the basis for detailed planning for future water management activities to solve priority problems in irrigated agriculture.

The successful outcome of the workshop is a trained cadre of professionals in water management in a country. With some limited assistance these professionals can extend the scope of the workshop many times over.

Two major benefits, then, of the workshop are these:

- Trained personnel in the principles, procedures and skills of identifying major problems in the management of an on-farm irrigation system.

- An analysis of the operation of the irrigation system in a selected region of the country where the training took place.

More Information

If you're interested in the workshop or would like more information about it, contact Dr. Worth Fitzgerald, Development Services Bureau, United States Agency for International Development, Washington, D.C. 20523.

After the course the trained personnel can identify major irrigation and crop reduction constraints for their country's on-farm irrigation system as these are doing here.

This booklet was prepared by staff of the Water Management Synthesis Project of the Consortium for International Development, with Colorado State University, Cornell and Utah State University serving as lead universities.

Prepared in cooperation with the United States Agency for International Development under contract AID-DSAN-C-0058.

January 1983

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