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MID-TERM EVALUATION
OF THE
COMMAND WATER
MANAGEMENT PROJECT

VOLUME ONE
FINDING AND RECOMMENDATIONS

ISPAN ACTIVITY NO. **624A**

ISPAN REPORT NO. **5**



IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST

Sponsored by the U.S. Agency for International Development



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**MIDTERM EVALUATION
OF
THE COMMAND WATER MANAGEMENT PROJECT
VOLUME ONE
FINDINGS AND RECOMMENDATIONS**

**Prepared for the Water Resources Division
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U.S. Agency for International Development
Islamabad, Pakistan**

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FOREWORD

This evaluation of the Command Water Management Project was carried out by a team brought together under the auspices of A.I.D.'s centrally funded Irrigation Support Project for Asia and the Near East (ISPAN). This team comprised Russell H. Betts, M.I. Chishti, Tariq Husain, Peter Reiss, and Gene White, and was joined for two weeks at midpoint by Stan Peabody, Senior Water Management Specialist from A.I.D./Washington.

The data upon which this report is based were assembled during the evaluation team's work in Pakistan, from 9 August through 24 September 1988, and included field visits to the seven CWM subproject sites. Reports on each of these seven subproject site visits are presented in a separate volume as Appendices to the report. That volume also includes the contractual scopes of work for both the evaluation team and the long-term technical assistance team, a list of key persons interviewed during the evaluation, and a selected bibliography.

In addition to the many discussions held with project personnel in the field, extensive interviews were conducted with Government of Pakistan officials at both the provincial and national levels, with responsible officials from the concerned donor agencies, and with technical assistance and supervisory consultant personnel assigned to the project. Everyone with whom the team came in contact was uniformly helpful and sometimes surprisingly frank, and we are indebted to all for their assistance.

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LIST OF TERMS AND ACRONYMS

<p>ABIANA ACE-ZCL ACS/DEV ADBP AF A.I.D. AKRSP AO ARD ARD, INC</p>	<ul style="list-style-type: none"> - Crop revenues - Associated Consulting Engineers and ZCL, joint venture - Additional Chief Secretary/Development - Agricultural Development Bank of Pakistan - Acre Feet - United States Agency for International Development/Washington - Aga Khan Rural Support Programme - Agricultural Officer - Agriculture and Rural Development - Associates in Rural Development, Inc.
<p>BIRADARI BLS</p>	<ul style="list-style-type: none"> - Kinship-based grouping - Baseline survey
<p>CADA CHAK COP CWC CWM</p>	<ul style="list-style-type: none"> - Command Area Development Authorities - The lowest order command, covering about 400 acres and 35 farm units - Chief of Party - Coordinated Water Course Program - Command Water Management Project
<p>DA</p>	<ul style="list-style-type: none"> - Diagnostic Analysis
<p>EADA EOPS</p>	<ul style="list-style-type: none"> - Extra Assistant Director Agriculture - End Of Project Survey
<p>FA FCC FE FGW FSR FY</p>	<ul style="list-style-type: none"> - Field Assistant - Federal Coordinating Cell - Field Engineer - Fresh Groundwater - Farming Systems Research - Fiscal Year
<p>GOB GOP GOS</p>	<ul style="list-style-type: none"> - Government of Baluchistan - Government of Pakistan - Government of Sind
<p>IDA IDS IIMI ISM ISR</p>	<ul style="list-style-type: none"> - International Development Association of the World Bank - Institute of Development Studies - International Irrigation Management Institute - Irrigation Systems Management Project - Irrigation Systems Rehabilitation Project
<p>JIRGA</p>	<ul style="list-style-type: none"> - Tribal Council
<p>KATCHA KHAN</p>	<ul style="list-style-type: none"> - Earthen - Clan leader
<p>MARKAZ M&E MO MOGHA MTP MWP</p>	<ul style="list-style-type: none"> - Center of a town or city, or smallest extension services unit - Monitoring and Evaluation - Managerial Organization - Outlet from the Minor/Distributary - Management Training and Planning - Ministry of Water and Power

NESPAK/NDC	- National Development Consultants - National Engineering Services (Pakistan) Limited, Joint Venture
NGO	- Non Governmental Organization
NIA	- National Irrigation Administration
NWFP	- Northwest Frontier Province
O&M	- Operation and Maintenance
OFWM	- On-Farm Water Management Program
OPP	- Orangi Pilot Project
PATWARI	- Government employee who makes the measurements of the crops and prepares assessment statements
P&D	- Planning and Development Department
PCC	- Provincial Coordinating Committee
PERI	- Punjab Economic Research Institute
PHE&ID	- Public Health Engineering and Irrigation Department
PID	- Provincial Irrigation Department
PIL	- Project Implementation Letter
PLL	- Precision Land Leveling
PM	- Project Manager
PME	- Planning, Monitoring & Evaluation
PPA	- Project Paper Amendment
PPC	- Provincial Policy Committee
PPW	- Participatory Pilot Watercourse
SARKARI	
KHAL	- Communal Watercourse
SAR	- World Bank Staff Appraisal Report
SASO	- Sind Agricultural Supplies Organization
SC	- Supervisory Consultants for CWM (ACE-ZCL and NESPAK-NDC)
SCC	- Subproject Coordination Committee
SCARP	- Salinity Control and Reclamation Project
SDO	- Sub-Divisional Officer
SE	- Superintending Engineer
SMO	- Subproject Management Office
SPA	- Subproject Area
SPM	- Subproject Manager
SRPO	- Sind Regional Plan Organization
TA/DA	- Travel Allowance/Daily Allowance
TAT	- Technical Assistance Team
TDY	- Temporary Duty Assignment
TEHSIL	- Small administrative unit at sub-district level
TOR	- Terms of Reference
TPM	- Team Planning Meeting
T&V	- Training and Visit Program
UAF	- University of Agriculture at Faisalabad
UNDP	- United Nation Development Program
USAID	- United States Agency for International Development/Pakistan
WAPDA	- Water and Power Development Authority
WARABANDI	- Systematic rotational schedule of irrigation deliveries to farmers served by a single watercourse
WC	- Watercourse
WMU	- Water Management Unit

**WMS
WUA
WUAD**

- **Water Management Systems**
- **Water Users Association**
- **Water Users Association Development Specialist**

XEN

- **Executive Engineer**

EXECUTIVE SUMMARY

This report summarizes the findings, conclusions, and recommendations of the midterm evaluation of USAID's component of the Command Water Management Project (CWM) in Pakistan. The evaluation, conducted at the end of the third year of activity, was undertaken to assess project progress, make recommendations designed to provide guidance for the remainder of the project, and inform the GOP, USAID, World Bank, and other donors about the value of similar CWM-type interventions elsewhere in the irrigation sector. The evaluation was undertaken by a six-person team of experts that examined project documentation, visited subproject sites, and interviewed all available concerned persons in Pakistan during August and September of 1988.

CWM'S primary objective is to increase irrigated agriculture productivity in Pakistan by exploring ways to bring about physical and institutional improvements within irrigation command areas. To achieve its goals, CWM was planned to be implemented around four separate but linked program objectives:

- **Governmental capacity building** — to build a continuing capability within provincial agencies for planning, implementing, operating, and maintaining integrated programs of irrigated agriculture. This was to be achieved through new organizational elements the project would introduce:
 - subproject management offices (SMOs) to coordinate the delivery of water and nonwater inputs and services, and manage new efforts to develop, test, and implement improved water management practices and monitoring/evaluation methodologies, and
 - mechanisms for coordinated institutional, physical, and operational improvements in specified sections of command

areas, including Provincial Policy Committees (PPCs) and Subproject Coordinating Committees (SCCs).

- **Popular participation** — to strengthen farmer participation in formal water user associations (WUAs) to improve their overall water and nonwater input management, and to provide an opportunity for a stronger voice in public decision making.
- **Water management** — to develop water management techniques and programs replicable over a wide range of agriclimate zones.
- **Productivity** — to increase agricultural production through improved water management, along with efficient supplying of agricultural services and nonwater inputs. Project activities are clustered in seven subproject sites, with the expectation that successful initiatives might be replicated elsewhere throughout Pakistan.

CWM activities began in July 1985, and are projected to end in June 1989, with a possible extension through mid-1991. The project budget is US\$81.9 million, of which US\$46.5 million is being provided by the World Bank for canal rehabilitation on distributaries and minors up to the outlet level. US\$25 million is being provided by USAID for watercourse lining below the outlet level and for institutional development activities and nonwater inputs. An additional US\$1.1 million comes from farmer contributions for watercourse improvements and US\$9.3 million constitutes the Government of Pakistan's program and administrative support.

Despite the design focus upon institutional development and related goals, the majority of project funds were budgeted for civil works construction. The completion of civil works is not a specific project objective. Nonetheless, the CWM design is clearly premised on assumptions that these

civil works would provide the foundation upon which efforts to achieve the project's stated noncivil-works objectives would be built. Accordingly, most project output indicators concern civil works completion targets, and little is specified concerning achievement of noncivil-works targets. This has significantly contributed to a project focus on civil works activities to the relative neglect of institutional development and related objectives.

Bringing about increases in agricultural production through CWM-type activities can be thought of as a two-stage process, each with distinguishable institutional development challenges, both for government agencies and for farmer participation:

- The challenge in the first stage is to undertake civil works; establish coordinating mechanisms for line departments; and organize farmers into water user associations (WUAs). CWM's first-stage activities represent a catalytic investment in institutional development and were required to energize line agencies and farmers to work toward the long-term objectives of effectively managing irrigated agriculture. While pursuing quantifiable civil works targets through familiar approaches, the challenge to the project is to effectively engage government and farmer capacities to develop new approaches to water and nonwater management.
- In the second stage, the challenge is to identify and operationalize noncivil-works incentives for institutional development; promote broader public- and private-sector involvement in the project; and nurture and support farmer involvement through WUAs on a continuing basis. This effort requires movement in directions unfamiliar to government agencies and farmers. There are few quantitative targets and no blueprints. In its place, a process of experimentation has to begin: new approaches to noncivil-works interventions must be operationalized, tested, refined, and replicated. New ways of combining government resources with the ingenuity and resources of farmers and other private-sector participants must be found, and structures and processes must give way to new and improved systems and procedures.

The first stage is a one-time highly subsidized investment; the second should inaugurate a continuing process. Experience suggests high pay-offs to carrying out both stages simultaneously, so that the experience of the first reinforces achievement of the second. Stage Two institutional development can be a difficult and tiring process, and its pursuit requires a long-term commitment of personnel and resources.

CWM has registered considerable success with respect to Stage One activities, but has been far less successful with respect to Stage Two. Specifically, the project's investment in civil works has generated considerable enthusiasm among line departments and farmers. Although there are no quantitative impact data, government officials and farmers report that these works have improved water availability and generally increased agricultural production. But CWM has had only limited success in institutionalizing improved government procedures and capabilities, generating broad-based farmer participation, or improving the appropriateness or availability of nonwater inputs to farmers in project areas. It has not yet demonstrated how it can build upon initial enthusiasm to promote sustained increases in agricultural productivity through improved management of water and nonwater inputs.

CWM's shortcomings have come about largely because of organizational and financial constraints to effective project management and meaningful farmer participation; inadequate understanding regarding the project's stated long-term development objectives; and the comparatively high level of project resources devoted to civil works. Similarly, strengthening of WUAs for sustainable postcivil-works activities is constrained by low levels of organizational, technical, and managerial skills; lack of incentives for further cooperative endeavor after completion of watercourse renovation; and the preemptive position of vested interests in rural development initiatives.

Given the challenges posed by these constraints, the high level of attention and staff time thus far committed to civil works has cost the project some critical lead time in identifying and developing interventions to address CWM's stated long-term goals. The limited efforts in farmer organization, water management techniques, technology transfer, input supply, credit, and marketing have yet to produce replicable models for improved management of irrigated agriculture. The result is

that both farmers and project staff view civil works as the only continuing activity for the project. This is an unsustainable approach, since subsidized civil works cannot be a continuing activity. The body of this report makes various recommendations to address related problems. The more important of these cluster in the following areas:

- **Project Definition.** Donors and those responsible for implementation need to examine and resolve discontinuities in understanding the essential project objectives. Consensus must be reached not only on the objectives, but also on the means to achieve them. Mechanisms must also be established to better focus project resources on Stage Two-type activities. These mechanisms must include improved use of the resources potentially available through the Technical Assistance Team.
- **Project Experimentation.** The experimental nature of the project needs

to be reaffirmed, and new initiatives need to be undertaken to redirect project implementation toward exploring new solutions to old and known problems.

- **Monitoring and Evaluation.** Inadequacies in current project M&E capabilities need to be addressed and rectified, so that M&E can better contribute to planning and can better learn from experience.
- **Sustainability.** CWM requires an operational vision of what it wishes to achieve and what kinds of procedures and structures it wishes to leave in place following its completion. The project currently is too consumed with moving money through civil works to focus on how to continue the institutional and procedural adjustments it should be promoting in the postproject environment.

1

BACKGROUND AND PROJECT DESCRIPTION

1.1 The Indus Irrigation System

The Indus irrigation system is the largest contiguous irrigation system in the world. It encompasses the Indus River and its tributaries, 3 major storage reservoirs, 19 barrages/headworks, 12 link canals, and 43 canal commands covering about 90,000 chaks. The canal system is roughly 39,000 miles long, and feeds a network of watercourses and field channels of one million additional miles. The Indus system also includes over 200,000 tubewells, about 13,000 of which are publicly owned. The contiguous system serves a total cultivable command area of over 30 million acres.

Water supplies conveyed exceed the design capacity and have strained the system in recent years. This stress, combined with deferred maintenance, causes frequent canal breaches and service interruptions. System irrigation-delivery efficiencies are low. Studies by the Water and Power Development Authority (WAPDA) indicate that roughly one-quarter of the surface water supplies dissipate through deep percolation and evaporation before reaching the chaks, where irrigation efficiencies average 40 to 50 percent. Inadequate or nonexistent drainage has caused serious surface flooding, a high groundwater table, and related problems of waterlogging and salinity. Water demand far exceeds supply, and all potentially cultivable land cannot be irrigated.

1.2 The Institutional Structure of Irrigation Management

The Indus irrigation system is characterized by the public-sector management of large gravity systems that have operated for many decades. A number of government agencies and departments share management responsibility: the Water and Power Development Authority (WAPDA), the Provincial Irrigation Departments (PIDs), and the Provincial Departments of Agriculture among them oversee the three major components of the physical system (dams, barrages and channels, and watercourses).

In actual operation, the PIDs also play a pivotal role at the watercourse level by being responsible for outlets and resolving water-scheduling conflicts among farmers.

WAPDA, an autonomous federal agency, was created in 1959 to supervise the construction of dams, barrages, and link canals that were part of the Indus Basin Project. Although the agency retains control of the storage dams, it subsequently turned over the barrages and link canals to the PIDs. WAPDA operates the dams in consultation with PIDs, respecting the water rights and seasonal allocations of the provinces. WAPDA is also responsible for the installation of tubewells constructed under the Salinity Control and Reclamation Project (SCARP) and for tile drainage programs throughout the country. On completion, the SCARP tubewells are turned over to the PIDs for their operation and maintenance.

The PIDs are engineering organizations with line responsibility for the design, construction, operation, and maintenance of the irrigation system down to the watercourse level. Each PID has an extensive field organization and a central secretariat, whose offices handle design, planning, equipment management, hydrology, and research. The PIDs are responsible for installing and monitoring the outlets to the watercourses. Historically, PIDs have also played an important role in distributing water among farmers on a rotational schedule (warabundi). When serious conflicts arise among water users, the superintending engineer (SE) or executive engineer (XEN) is asked to impose a schedule or resolve a particular problem.

Around 1977, the Provincial Departments of Agriculture first became directly involved in irrigation, through the On-Farm Water Management Project (OFWM). An OFWM cell at the federal level and directorates under the provincial departments coordinate and carry out watercourse improvements. The directorates are mandated to rehabilitate watercourses, carry out a precision land-leveling program, and provide water management

extension services. OFWM has a field team in each tehsil, or subdistrict-level administrative unit, that includes one agricultural officer (AO) and two field assistants (FAs) who carry out the water-related extension. In practice, because the program focuses on watercourse rehabilitation, little actual extension takes place.

The OFWM program has an ambiguous relationship with the Agricultural Extension Directorate, which is also situated in the Agricultural Department, and the issue of a home for water management extension remains unresolved. At the present time, only OFWM is mandated to provide water management extension. Agricultural Extension services focus on more traditional inputs. Field-level work is done by Agricultural Extension staff designated as either AO or FA. Each AO supervises five to six FAs, who are each expected to service one Union Council (comprising at least 1,000 farm families). Seven years ago, Agricultural Extension introduced a pilot Training and Visits Program (T&V) in Punjab and Sind. FAs are supposed to work closely with contact farmers and are each programmed to visit 64 farmers every two weeks. As indicated, these extension activities traditionally have not dealt with irrigation or water management issues; thus, related matters have gone largely unattended.

Water user associations (WUAs) were first developed in response to OFWM requirements. The physical improvement of watercourses throughout the country was tied to special arrangements for managing resource mobilization, thus ensuring farmers' contributions toward labor and materials costs. The creation of WUAs was identified as a condition for watercourse renovation early on, and the associations have remained an important feature of the OFWM program. In 1981 and 1982, the four provinces approved ordinances giving legal status to the WUAs, although the ordinance provisions differ among the provinces.

The approach to WUA development has been heavily "top-down." Under OFWM, the WUAs are organized rapidly into formal, legal entities so that watercourses can be improved. The associations primarily mobilize labor for the physical improvements. The GOP has also viewed the WUAs as a vehicle for postimprovement maintenance of the watercourses. However, WUA sustainability has been the most conspicuous failure of the OFWM program. With few exceptions, the associations have remained active only during the construction period. As noted, a principal CWM objective is to set a means to assure some

sustainability for WUA activities following completion of watercourse lining.

1.3 Recent GOP and Donor Initiatives in Pakistan Irrigation Development

For the first two decades following Independence, irrigation-sector investment concentrated on major storage projects, barrages, and link canals. At the federal level, these efforts were implemented through WAPDA, but little provincial-level investment was made. However, since the late 1960s, much of the development of Pakistan's irrigation system has focused on rehabilitating PIDs and improving canals, surface drains, and watercourses. Accompanying these civil works has been an effort to enhance the capabilities of the provincial irrigation and agriculture line agencies that do irrigation planning, design, research, and operation and maintenance.

USAID's involvement with water management in Pakistan began in the late 1960s, with the Water Management Research Project. A team from Colorado State University worked with WAPDA and identified a method to improve watercourses and reduce conveyance losses. The methodology included lining a portion of the watercourse head reach with brick and concrete; improving the katcha for the remainder of the watercourse run, and using poured-concrete farm outlets, or pacca nukkas. Consistent with prevailing approaches of the day, that research project dealt with engineering aspects of irrigation only, and not with the agricultural and social aspects.

Watercourse rehabilitation was institutionalized in the Ministry of Food and Agriculture as the OFWM program. OFWM has received support from USAID, the World Bank, and the Asian Development Bank. Still an ongoing nationwide effort, both the GOP and donors consider the program to be a precursor of CWM.

OFWM now also provides other limited services, such as precision land leveling, demonstration of water management practices, and training of field staff and farmers. No provision exists for subsidized inputs in the program, other than those directly related to lining.

The Irrigation Systems Management Project (ISM), also supported by USAID, is another major commitment to irrigation development in Pakistan. The civil works component, cofinanced by the World

Bank as the Irrigation Systems Rehabilitation Project (ISR), seeks to rehabilitate selected canals and drains. A second component focuses on management and technical skills development at the federal level and in the PIDs. The research component works with many of Pakistan's research institutions on a wide-ranging program of irrigation-related issues. The linkages between CWM and the ISM research component were expected to be very close. CWM was to provide locations for fieldtesting ISM research results. CWM is the most recently initiated component of this overall package of donor support and GOP commitment to improving Pakistan's national irrigation system.

1.4 The Command Water Management Project

1.4.1 The Origin of the CWM Concept

The Command Water Management Project has evolved from an approach first articulated in WAPDA's 1979 Revised Action Programme for Irrigated Agriculture. That document promoted a "command area management" concept that envisaged the integration of command-level specialist agencies under a single authority with clearly defined responsibilities for increasing agricultural productivity. These canal-based command authorities were to be located in areas requiring significant construction and were to introduce a system of information exchange and coordination among a variety of government agencies. WAPDA originally placed itself at the head of these authorities but withdrew when faced with opposition from provincial departments.

In 1982, WAPDA conducted a major feasibility study of the project, with grant financing from UNDP and technical assistance from USAID. The study, "Feasibility Report, Command Water Management Project," provided much background data and many of the operating concepts ultimately included in the project package.

1.4.2 World Bank Involvement

A World Bank Appraisal Mission then prepared detailed plans for implementing the CWM Project on seven commands identified in the WAPDA feasibility report. The mission's Staff Appraisal Report (SAR) for CWM, completed in April 1984, proposed that CWM objectives should comprise the following:

- Increase agricultural production through improved water management and efficiently inputs.
- Develop water management techniques and programs replicable over a wide range of agroclimatic zones.
- Build within the provincial agencies a continuing capability for planning, implementing, operating, and maintaining integrated and efficient programs of irrigated agriculture.
- Strengthen farmer participation in formal water user associations to improve their overall water and nonwater input management, and provide them with opportunities to have a stronger voice in decision making.

These objectives subsequently were adopted as the organizing principles around which CWM was designed.¹

1.4.3 USAID Participation

The SAR team included USAID staff and consultants. During the preparation of the SAR, CWM components and activities were divided between the two donors. The World Bank, through IDA, agreed to finance investigations and surveys; civil works related to canal rehabilitation, remodeling, and drainage components; vehicles, radio communications, survey equipment, and office

¹ It should be noted that USAID's own later operative project document, its Project Paper Amendment (PPA), diverged from the SAR with respect to the project's fourth objective. Although the next of the PPA supports strengthening farmers groups, the objective is stated as being "a reduction in inequities in actual water deliveries in the tail reach as compared to the head reach of canals at all levels...through both revised scheduling and improved conveyance efficiencies." During project implementation, USAID seems to have abandoned this objective in favor of the SAR's, and it is no longer referred to in project discussions.

equipment and furniture; local experts; and incremental field and project management staff. USAID agreed to fund OFWM civil works, water management equipment; and expatriate experts. Funding was also made available by the GOP and provincial governments. Farmers were to contribute to watercourse improvements by providing donated labor and a portion of the lining-materials costs. Anticipated project funding levels in the SAR are given in Table 1-1.

Table 1-1

CWM Project Financing, Including
Proposed USAID Component
(\$ Million, 1984)

<u>Project Elements</u>	<u>GOP GO Prov.</u>	<u>Farmers Cash Contr.</u>	<u>IDA</u>	<u>USAID</u>	<u>Total</u>
1. Investigations and Survey	0.1	-	1.1	-	1.2
2. Land Acquisition	1.4	-	-	-	1.4
3. Civil Works	3.2	1.1	39.6	19.4	63.3
4. Equipment and Vehicles	1.2	-	1.5	0.3	3.0
5. TA and Training	-	-	1.8	5.3	7.1
6. Recurrent Cost	3.4	-	2.5	-	5.9
Total	9.3	1.1	46.5	25.0	81.9

CWM project documents were initiated in 1985, and the project was scheduled to run for five years. Given implementation delays that have occurred, project extension to mid-1991 is being considered.

1.4.4 Overall Project Goal and Purpose

The goals of the CWM must be set within a dual context: Pakistan's program needs in the irrigation

sector and the project goals of the Irrigation Systems Management Project (ISM), of which CWM is a part. The ISM Project seeks to increase the capabilities of institutions involved in irrigation system planning, design, research, and operations and maintenance; to carry out physical improvements to the system; and to bring about policy changes needed for proper irrigation water management. The CWM component is designed to help achieve these objectives both by strengthening collaboration

system planning, design, research, and operations and maintenance; to carry out physical improvements to the system; and to bring about policy changes needed for proper irrigation water management. The CWM component is designed to help achieve these objectives both by strengthening collaboration among existing institutions and by introducing an enhanced and continuing role for farmers' groups. By integrating these two approaches, CWM will attack the major constraints to increased irrigated-agricultural production in selected subproject areas. CWM is an experimental pilot project designed to formulate and test institutional development models for subsequent replication elsewhere throughout Pakistan.

1.4.5 Subsequent Locations

CWM was established as a pilot activity designed to identify and test different solutions to a variety of existing challenges and constraints. As a consequence, special efforts were made to cover different agroclimatic and hydrological zones, as well as different socioeconomic situations. Seven subproject areas were chosen: Pakpattan, 6R/Hakra, Niazbeg, and Shahkot in Punjab Province; Sehra-Naulakhi in Sind Province; Warsak Lift in Northwest Frontier Province; and Las Bela in Baluchistan Province. These pilot areas together represent about 510,000 acres of cultivable land, and contain well over 1,000 watercourses that vary in

length from 1.5 to 3 miles. Over 700,000 people, living in 391 villages, are estimated to inhabit the subproject areas.

1.4.6 Project Structure

CWM mandates the creation of a multitiered management structure, encompassing the federal and provincial governments. The Ministry of Water and Power is the principal federal organization responsible for CWM. Project design documents anticipate that a Federal Coordination Cell (FCC) would secure support for the CWM approach in relevant federal ministries, including Agriculture and Finance; facilitate exchanges of information among the four Provincial Policy Committees (PPCs); assist USAID, the World Bank, and the PPCs to monitor and evaluate project impact; and submit the SMOs' approval requests for civil work schemes and reimbursements to USAID and the World Bank. The provincial governments, through their line agencies in the Departments of Irrigation and Agriculture, are responsible for implementing and operating subproject activities. Three new entities were created to assist in carrying out these tasks: the Provincial Policy Committees (PPCs), The Subproject Management Offices (SMOs), and the Subproject Coordinating Committees (SCCs). Subsequent chapters discuss the mandate and activities of these entities, as well as the role of contractually provided technical assistance.

2

CIVIL WORKS

2.1 The Preemptive Position of Civil Works in the Project

The Command Water Management Project was conceived and designed as a mechanism for exploring several different institutional, social, and technical means to increase Pakistan's irrigated-agriculture productivity. The primary intent was to facilitate experimentation into new solutions to old problems. During its first three years, however, CWM implementation has been driven by priorities that have diverted it into a preemptive preoccupation with fulfilling a set of civil works construction targets.

None of the project's four declared objectives make explicit, or even passing, reference to physical infrastructure construction activities such as canal rehabilitation or watercourse lining. Nonetheless, these activities continue to dominate the time and attention of an overwhelming majority of the agencies and individuals associated with the project.

2.1.1 Causes

Several compelling reasons can be suggested to explain why civil works dominate:

- Civil works take precedence. Many view the provision of a reliable water supply through canal rehabilitation and watercourse lining as a necessary prerequisite to efforts to increase agricultural productivity by other means.
- Project beneficiaries express needs for physical improvements. In contrast, few express a demand for such project interventions as better interagency coordination.
- The bulk of funds in CWM are earmarked for civil works activities, project-stated objectives notwithstanding. For the most part, noncivil-works activities receive inadequate funds. Priorities in all project activities usually reflect the allocation of financial resources.

- The project staff and principal concerned agencies are staffed almost exclusively by engineers, whose civil works experience and capabilities generally far exceed their training related to noncivil-works matters.
- Civil works activities are measurable and progress is readily quantifiable. Within the prevailing system among agencies concerned with CWM implementation, performance is assessed in terms of achieving numerical targets. Incentives such as career advancement and financial benefit are related to this same approach. Few incentives relate to the qualitative components of the CWM Project.

CWM project documentation itself emphasizes civil works activities at the expense of noncivil-works activities. The basic reference work for CWM, the World Bank's SAR, specifies performance indicators that are dominated by measurable civil works activities such as miles of watercourses lined or acres of precision land leveling completed. Measurement criteria for change in social organization and institutional development--the real core of CWM--are nowhere specified, and thus no guidance focuses project resources and activities on achievement of noncivil-works objectives. Moreover, whatever attention is drawn to noncivil-works interventions in the World Bank and USAID documentation is progressively diluted in the GOP's authorizing documents, the PC-Is at the federal and provincial levels. Nearly all formal and official guidance to the Subproject Management Offices (SMOs) in the provincial PC-Is concerns the project's civil works requirements and the organizational structure for civil works implementation.

2.1.2 Consequences

There are at least three fundamentally important consequences of this situation:

- Project efforts to address CWM's stated objectives have been subordinated to achieving

progress on civil works. For example, forming key project interagency committees has contributed to interagency coordination; the committees, however, were established to meet specific civil works output targets, rather than arising from a conscious effort to modify institutional behavior in ways that might contribute to project objectives and be sustained beyond the construction phase of the project.

- The project has not yet developed a clear vision of what is to be achieved with respect to its objectives, nor of how best to achieve them. As a consequence, no measure of performance has been established.
- Experimentation, which was to be a hallmark of this pilot project, is not evident in project implementation.

Movement toward achieving project objectives is occurring in the absence of explicitly focused activities. These achievements are primarily by-products and may not be sustained beyond the end of the project. However, there is some notable progress. Interagency coordination is occurring for the first time, people are talking about a legitimate role for farmers (through WUAs) in development planning and delivery of water and nonwater inputs, and elements of plans for improved command- or farm-level water management techniques are beginning to emerge. Such movement, irrespective of the fact that it flows out of what remains essentially a civil works focus, may be sufficient interim verification of the validity of the concepts upon which CWM has been based. Construction progress in Baluchistan has been satisfactory for the lining of minors, but very poor for watercourse lining. Because diversion gates for the minors have been late in arriving, the portions that connect the main canal to the minor remain unfinished.

Construction quality has been adequate, but the expansion/contraction joints at many locations in the lining contain defects (repairable). One minor has been constructed as a pipeline, which will cause severe maintenance constraints if the pipeline leaks. Supervising consultants carry out spot checks, only, on the construction and therefore are unable to conclusively determine that the works have been carried out according to contract specifications.

2.2 Civil Works Activities

CWM's civil works targets, by province, and achievements through June of 1988 are shown in Table 2-1.

2.3 Assessment of Civil Works Progress by Province

2.3.1 Baluchistan (Lasbela)

The major civil works challenge at the Lasbela SPA is to get the watercourse-lining program moving and ensure that the waterlogging problem created by the Lasbela Canal construction is at least stabilized and hopefully reduced.

2.3.2 Sind (Sehra/Naulakhi)

In the Sind, lining of both minors and watercourses has been slower than projected. The construction quality for the lining of minors and watercourses is adequate, as is the structure construction. Construction supervision is too limited.

2.3.3 Punjab (4 Subprojects)

The main construction challenge in the Punjab is to improve the implementation progress for drainage works. These works are important to relieve waterlogging and salinity, and to allow lands to fully realize the benefits of canal lining.

In the four Punjab subprojects, construction progress for the lining of minors and watercourses has been good. The lining proposed for some distributaries has not started. Although construction progress on drainage canal structures is adequate, the progress in drainage canal excavation has been poor. The installation of tubewells proposed for subsurface drainage on the Shahkot subproject has not yet started.

In the Punjab, construction quality for the lining of distributaries, minors, and watercourses is adequate but could be improved. Structure construction quality is adequate, but the drainage channels are not being excavated to the lines indicated on the plans. No drainage channels have been completed. Construction supervision for both the minors and watercourses is inadequate.

TABLE 2-1

Targets

LASBELA - BALUCHISTAN

<u>Activity</u>	<u>SAR Target</u>	<u>Actual</u>
Canal rehab, mi.	14.70	0.00
Canal lining, mi.	11.60	4.00
Remodel outlets, nos.	61	0
Line water courses, nos.	60	0
PLL, acres	300	0

WARSAK CANAL/LIFT PUMPS - NWFP

Canal rehab, mi.	0.15	0.30
Canal lining, mi.	10.00	15.50
Remodel outlets, nos.	151	0
Pumps/Structure, nos.	4	0
Line Water courses, nos.	100	30
PLL, acres	200	0

SHAHKOT - PUNJAB

<u>Activity</u>	<u>SAR Target</u>	<u>Actual</u>
Canal rehab, mi.	23.46	23.46
Canal lining, mi.	10.00	10.23
Remodel outlets, nos.	95	90
Surface drainage, acres	12,000	2,500
Tubewells, nos.	36	0
Line water courses, nos.	75	53
PLL, acres	6,400	4,850

NIAZBEG - PUNJAB

Canal rehab, mi.	11.44	11.44
Canal lining, mi.	16.20	14.00
Remodel outlets, nos.	68	58

PAKPATTAN - PUNJAB

Canal rehab, mi.	54.95	45.10
Canal lining, mi.	38.70	36.92
Remodel outlets, nos.	203	195
Line water courses, nos.	162	132
PLL, acres	6,400	4,850

6R HAKRA - PUNJAB

Canal rehab, mi.	25.89	24.89
Canal lining, mi.	33.40	28.50
Remodel outlets, nos.	281	66
Surface Drainage, acres	36,000	2,000
Line water courses, nos.	225	181
PLL, acres	6,720	6,222

SEHRA/NAULAKHI - SIND

Canal rehab, mi.	108.50	73.20
Canal lining, mi.	73.20	22.10
Remodel outlets, nos.	451	237
Line water courses, nos.	360	223
PLL, acres	6,850	6,159

TOTALS

Canal rehab, mi.	238.59	185.69
Canal lining, mi.	193.10	131.25
Remodel outlets, nos.	1,327	590
Line water courses, nos.	1,050	677
PLL, acres	28,740	24,066

2.3.4 NWFP (Warsak)

In the NWFP, progress in the placement of the lining in the main Warsak Canal has exceeded the target. The manufacture of the pumps required to lift water to the canal has not been completed by the USA manufacturer. Progress for the lining of the water courses is only fair.

Construction quality for the lining of the Main Warsak Lift Canal is barely adequate, as is the lining of the watercourses. The expansion/contraction joints in the main canal were defective at many locations, and repairs had been made to the surface of the lining and to joints at many locations. Although the canal is only one or two years old, many pockets were noted in the lining surface. No bridges have been provided nor has any provision been made for animal crossings. Construction supervision for both the main canal and the watercourses is too limited.

2.4 Consultant Services

2.4.1 NDC-NESPAK (IDA component)

The consultant for the IDA portion of the civil works, NDC-NEDPAK, has played an active role in preparing the designs, estimates, and contract documents for the civil works, and also has input into the final acceptance or rejection of the completed works. Unfortunately, NDC-NESPAK is not required to inspect the works on a full-time basis and thus it is difficult for them to determine if construction conforms to the contract specifications or if the works have been constructed satisfactorily. This consultant is highly competent and has a large pool of experts from which it can draw.

2.4.2 ACE-ZCL (USAID component)

ACE-ZCL, the consultant for the USAID portion of works, check the surveys and designs prepared by the OFWM staff for watercourse lining. In Baluchistan, they play a more active role since the OFWM staff there are insufficient and inexperienced. ACE-ZCL is supposed to visit the construction works involved in watercourse lining only twice during implementation, and thus is in no position to determine if the works have been constructed according to specifications. The consultant can judge only superficially that the works will function satisfactorily.

2.4.3 Associates in Rural Development (Technical Assistance Team-TAT)

According to its TOR, the TAT was to assist the planning and implementation of the civil works. One SPM reported that the TAT interpreted its scope of work (SOW) in a way that excused the team from having any responsibilities with regard to producing design solutions, and instead restricted their activities to giving advice, when requested, relating to noncivil-works matters. This does not conform with the SOW incorporated into the TAT's contract for CWM. If they had become more integrated into the activities of the SMO, as discussed in later chapters, they might have provided advice as needed. Team members have assisted the Baluchistan SMO in the design of the drainage facilities, although in other provinces they have not been actively involved in civil works implementation.

2.5 Summary

The progress of civil works construction is generally adequate except for watercourse and outlet construction in Baluchistan, drainage channel excavation and lining in Punjab, and the provision of pumps for the Warsak Lift Canal. Virtually no precision land leveling has been carried out in Baluchistan and the NWFP, and it appears that not much benefit in the form of improved water management has resulted from precision land leveling in any of the provinces. Drainage works have yet to become operational.

The quality of civil works construction has been adequate, particularly where the SPM has been from the PID. In the Punjab, where the civil works component is large, the IDA portion of the works had a full-time PID superintending engineer, which resulted in relatively good coordination. He was assisted by three PID XENs and ten SDOs.

In Baluchistan and NWFP, the SMO and SPM implement the civil works program. This has meant that less of their attention is directed at the noncivil-works activities of the project. The Punjab and Sind SPMs both come from the Agriculture Department. However, the SPM in Sind has played a stronger role in civil works implementation than has the SPM in Punjab.

The civil works do not appear to have had any adverse environment impact. The Lasbela Canal in Baluchistan had previously contributed to the

waterlogging of this area, but some of the drainage works undertaken by CWM have been designed to alleviate this waterlogging and salinity. Similarly, at the 6R Hakra Subproject the surface drainage works will have a positive environmental impact since they should collect and remove excess runoff. The tubewells proposed for the Shahkot Subproject are designed to lower the subsurface water table and reduce waterlogging and salinity.

2.5.1 Key Issues Related to Civil Works

Persistence of OFWM Approaches

The USAID component of CWM civil works (watercourse lining) remains essentially identical to the OFWM approach. This is not in conformity with the basic goals and objectives of CWM, which intends to significantly broaden and enlarge that approach.

Watercourse Lining Percentages

The SAR and PP prescribed percentages of the length of watercourses that would be lined based on several criteria, including the type of soil the watercourse passed through and the type of groundwater conditions that prevailed in the canal area. In Baluchistan, the area was waterlogged and the soils relatively porous. In the NWFP, the soils were relatively tight, the area was not waterlogged and the groundwater was sweet. Some subprojects in the Punjab had saline groundwater (6R Hakara), and some other projects had sweet groundwater (Shahkot). The percent of each watercourse to be lined for each subproject is presented in Table 2-2.

TABLE 2-2

Percentage of Watercourse Length to be Lined

Subproject	Province	Percentage
Lasbela	Baluchistan	50
Naulakhi/Sehra	Sind	15
Shahkot	Punjab	20
Niazbeg	Punjab	15
6R Hakara	Punjab	40
Pakpattan	Punjab	15
Warsak	NWFP	15

These percentages may not have reflected actual field conditions, and evaluation team discussions at SPAs in all four provinces suggest that they are widely perceived as having been applied without sufficient regard for local conditions. Usually the lining was placed at the initial head reach for 15 to 20 percent of the watercourse length. When problem areas existed further along the watercourse, such as the presence of a village or porous soil conditions, provision was not made for lining in these areas. Conflict, confusion, and disagreement have developed over such problems. USAID is widely perceived as being unnecessarily inflexible about changes in these percentages and, certainly after its Project Implementation Letters (PILs) have been issued, has allowed no change in the predetermined percentage of length that could be lined.

Reimbursements to GOP

For the IDA component of the civil works, reimbursement to the GOP for completed work is reported as quite satisfactory. An increase in the value of U.S. dollars against rupees has provided funds for additional works. Plans and budgets for implementation of these additional works have been prepared by the PIDS.

As in the case of watercourse lining, USAID is widely perceived as being unnecessarily inflexible in its reimbursement procedures. According to GOP/CWM personnel, the current system does not work as smoothly as the World Bank's. Turn-around time for both issuance of PILs and reimbursements against them varies greatly, and the GOP uniformly reports a longer processing time than does USAID. The evaluation team did not examine this issue in any depth, but the frequency with which it was raised by GOP personnel suggests that it is a matter that merits USAID review.

Linking Civil Works To Institutional Development

Civil works and institutional development activities should be linked to one another in such a way that civil works activities, no matter how urgently they might be desired, could not be undertaken until specified institutional development preconditions were met.

3

STRENGTHENING NATIONAL CAPACITIES IN IRRIGATED AGRICULTURE

Historically, the public-sector management of Pakistan's irrigated agriculture has been divided among a number of government agencies. Differences in responsibility characterize the functions of the Provincial Irrigation and Agriculture Departments, as well as other concerned government agencies such as the District Administrations. Similar separations occur within the same line agency, the most important being between OFWM and the Agricultural Extension Service in the Provincial Departments of Agriculture. This separation has caused an inadequate integration among linked components and uncoordinated use of resources. The lack of integration has, ultimately, contributed to low agricultural productivity.

The CWM documents specified the creation of a hierarchy of institutions designed to facilitate the interagency coordination required for project management and implementation. These are--

- Federal Coordination Cell
- Provincial Policy Committees
- Subproject Management Offices
- Subproject Coordinating Committees
- Water Users Associations

The institutions are project-specific and four are government units that fall under CWM's institutional development objective. The fifth, the water users associations, is a farmers' participation initiative and will be discussed separately in Chapter Four.

3.1 Federal Coordination Cell (FCC)

The FCC is headed by the Joint Secretary (Water) of the Ministry of Water and Power. It is charged with securing appropriate support for the CWM in relevant federal ministries, as well as with coordinating project activities between the GOP, donor agencies (USAID and IDA), provincial

governments, the technical assistance team, and the local supervisory consultants. The FCC releases project funds to the provinces, administers contracts with local supervisory consultants, and gives necessary clearances for TAT activities. The FCC monitors the project progress through periodic review meetings and assists with project implementation at the federal level.

The FCC offers direction to CWM through the coordination meetings and has supported the SMOs in resolving their problems at both federal and provincial levels. It has not effectively used its budgetary authority to promote institutional development progress in response to the stated project objectives.

3.2 Provincial Policy Committees (PPCs)

The PPCs, headed by the Additional Chief Secretary of P&D, with Secretaries of Finance, Agriculture, and Irrigation Departments as its members, review and approve annual provincial work plans and program resources. The PPCs are expected to formulate policies to achieve CWM objectives; coordinate line agencies at the provincial level; review and sanction annual work plans prepared by the Subproject Management Offices; program provincial-department and private-sector inputs in keeping with the approved work plans; and review the status of CWM activities and take remedial action as necessary.

In the initial stages, the PPCs worked hard to bring together the line agencies via the coordinated SMO's office, to see that those units became functional, and then to approve the annual work plans after thorough reviews. These activities were very creditable. However, the PPCs now seem to play a limited role, as is evident from the various pending issues upon which the PPCs have been unable to act,

such as using the TAT more effectively or providing policy guidance on handling the absentee landlord issue in the Lasbela Subproject Area.

These high-level provincial committees should review the project activities more regularly and give their continued support to SMOs to enhance interagency coordination. Similarly, PPC members should be encouraged to meet with lower-level officials in their line agencies to promote and coordinate CWM's institutional development goals.

3.3 Subproject Management Offices (SMOs)

The SMOs have been described as the key element in determining CWM success because they are most directly responsible for project implementation and interact most directly with the other organizations involved. The SMOs are responsible for transforming PPC policy guidelines and directives into specific objectives and measurable outputs. The offices also establish and manage monitoring and evaluation programs to provide continuous information on activity status, allowing for better decision making for future activities. Each SMO is required to prepare an annual work plan for submission to the SCCs and PCCs; prepare quarterly and annual progress reports; review civil works schemes prepared by OFWM and submit them to USAID through the Ministry of Water and Power; and develop training plans.

The general characteristics and specific accomplishments and challenges of the SMOs in the four provinces are presented in detail in the separate site reports on field visits made by the evaluation team. These reports appear as appendices in Volume Two of this report.

The SMOs' position is anomalous. They are temporary project management units with limited operational authority; their main function is to coordinate operating entities that have limited history of working together. The SMOs have little or no budgetary authority over project funds for activities implemented by other agencies. Furthermore, SMO personnel are largely seconded from agencies to which these individuals are likely to return when the project is ended, thus diminishing their career loyalties to the SMOs.

The SMOs have registered some important successes in project implementation. Most markedly, they have been especially effective in coordinating civil works activities. Further, the emerging coordination

among various line agencies and the initiatives toward water management and nonwater inputs may represent important trends.

Each SMO is mandated by CWM to have two separate operating units: one to develop improved water management technologies and programs, the other to handle project monitoring and evaluation (PM&E) requirements. Although water management units have been established in all the SMOs but Baluchistan, in each case the staffing is inadequate. The TAT also has been unable to provide adequate support. As a consequence, no operational water management plans have been prepared or implemented so far.

PM&E units of the SMOs are to prepare monitoring and evaluation programs with the assistance of the TAT and appropriate provincial organizations, and to then carry them out with internal and external support. These units might be expected to carry out two types of monitoring:

- project-input monitoring, including civil works, procurement, staff recruitment, and implementation of crop development programs. These activities, which essentially monitor the inflow and utilization of project funding, normally would result in regular reports summarizing project progress toward meeting specific disbursement goals.
- project-output monitoring, including assessments of the impacts of project experiments or interventions, and summary lessons learned. Data for such monitoring should include, among others, changes in water supplies, cropping intensities, crop yields, net farm incomes, and social wellbeing. The TAT and provincial organizations like PERI in Punjab and SRPO in Sind are supposed to assist the SMO in developing such output monitoring and analysis activities. This has not been successfully carried out thus far.

3.4 Subproject Coordinating Committees (SCCs)

The provincial governments were required to establish a SCC for each subproject area, with membership comprising representatives from the PID, the Agricultural Extension and OFWM Directorates, the WUAs, SMO personnel, and suppliers of nonwater inputs and credit. These groups, chaired by the SPM, are expected to convene regularly to coordinate line departments and private-

sector delivery of inputs and services in keeping with the annual SMO workplans, which they sanction.

SCCs potentially provide a venue at which WUA or farmer needs can be expressed, at one location, to the full range of potential providers of services. To the extent this happens, it represents a positive departure from the usual practice that requires individuals or groups needing assistance or having grievances to visit individual offices. It also allows the different agencies to consider the advantages and requirements for coordination in the supply of inputs.

SCCs have been formed in all the subproject areas. Their characteristics and usual performance follow.

In Sind, the SCC meetings are reported by the SPM to be held quarterly at the SMO office. A large number of people come there and the SMO receives them by providing a lunch. In the meetings, discussion encompasses review of the farmers' progress, demands, complaints; annual work plans; and shortages of nonwater inputs. These meetings are dominated by discussions of civil works matters. The evaluation team found that these meetings are primarily ceremonial in nature, because the SPM's management style is such that potential disputes have been discussed and resolved in personal meetings prior to the SCC meeting. Thus, the SCC functions largely to endorse decisions reached earlier in other venues.

In NWFP, the meetings are held quarterly at the SMO office, and farmer participation reportedly is by invitation only. Only a few interested and influential farmers normally participate and this participation seems to be lagging. The meetings are essentially among concerned line agency personnel for purposes of project coordination.

In Baluchistan, the SCC meetings are held in the SMO office and frequently are heated events. It is questionable whether issues are resolved at Lasbela meetings, but the meetings clearly furnish a venue for an open exchange of ideas.

In Punjab, the SCC concept was reportedly opposed initially on the grounds that such an entity was potentially political. Ultimately, SCCs were formed to meet the project requirements. Meetings are now held fairly regularly within all of the four subproject areas. The following items are featured:

- **Annual Work Plan.** Before the SMO's annual work plan is prepared, its outline is explained

to participants and their views are obtained on the priorities and contents. Line agencies then prepare their plans, and the SMO prepares a consolidated work plan.

- **Project Progress.** Line Agencies present progress during the last quarter and solicit input for their next quarter's program.
- **Training Session.** Agricultural Extension staff explain crop conditions and needs for water and nonwater inputs. Other agencies may explain their procedures.
- **Immediate Problems.** Participants discuss such topics as tail-water supply, watercourse material supply, watercourse additional lining, and credit complaints.

Line agencies are responsible for redressing the complaints registered at these meetings, and the SMO is charged with follow-up.

SCCs have involved the line agencies and farmers in implementing the Work Plans and trying to solve farmers' problems. SCCs have been less effective where project provisions and government policies place limitations on their working. For instance, the GOP stopped interest-free credits to farmers this year, and additional lining demanded by farmers on (possibly) justified grounds is not allowed. The SCCs are unable to offer any solution.

It is too early in the implementation of CWM to determine which of the approaches adopted by the four provinces, or perhaps some completely different model, might ultimately be best: this is a matter that project management should monitor and review periodically as implementation progresses.

Because four separate SPAs exist in Punjab, a special Project Coordination Committee has been formed, which is headed by the SPM and includes representatives of the line agencies and project consultants. It appears that this committee was formed to give the SMO enhanced authority, in order to facilitate better interagency coordination without having to refer matters to the PPC, whose members are sufficiently senior in the government hierarchy that they cannot give CWM the attention to detail that it occasionally requires. The committee is a project implementation innovation that merits further monitoring by the FCC and donors to determine if it might become a useful design modification for future CWM projects.

3.5 Other Agencies

Several other agencies, although they are not directly part of the SMOs, play important roles in the implementation of CWM and its ultimate success.

3.5.1 Provincial Irrigation Department (PIDs)

Surveys, design, and scheme preparation are the normal functions of the PIDs. The delegation to consultants of these normal PID functions (especially in Punjab and Baluchistan) may be weakening the existing capability of the PIDs and, therefore, be contrary to the institution building objective of CWM.

3.5.2 Extension Services

At present, the Extension staff is expected to pursue the nonwater inputs in CWM subproject areas, but they are neither institutionally involved in the project nor do they have any stake in it. They receive no project facilities nor any project funding, and CWM requests for their participation are often viewed as an extra burden. The nonwater activities are making no progress and CWM has failed to link stated project objectives with the financial resources required to assure effective implementation.

3.5.3 On-Farm Water Management (OFWM)

OFWM is responsible for registration of WUAs and improvements of watercourses. After the improvement, OFWM activities on the watercourses cease. OFWM has the potential to enlist farmers' support for further activities of the project, i.e., the nonwater inputs and improvement of water management, and this should be exploited more fully than it has been to date.

3.5.4 District Administration

The District Administration/Revenue Department, which is responsible for law and order, land tenure, and revenue collection, plays an important part in the life of the farmer and in land use. This agency seems to be inadequately involved in the project. Their lack of involvement is unfortunate because some of the problems that are beyond the SMOs' competence to solve might more easily be handled there.

3.6 Technical Assistance team (TAT)

A total of 287 months of technical assistance is provided for in the project documentation: 221 months of long-term expatriate, 18 months of short-term expatriate, and 48 months of long-term local. USAID has contracted with an American consulting firm, Associates in Rural Development, Inc., to provide this assistance. Two spacious and well-equipped technical assistance team (TAT) branch offices are in place, one in Lahore and the other in Karachi. Each includes a farm management specialist, water management specialist, extension specialist, and agronomist (locally hired). The Lahore team assists to the SMOs and line agencies responsible for five subproject areas in Punjab and NWFP, and additionally houses the team leader/systems management specialist and the training systems management advisor. The Karachi team supports the SMOs and line agencies in the two subproject areas in Baluchistan and Sind. Neither of the TAT offices are located adjacent to any of the SMOs or subproject sites. TAT specialists travel to meet SMO or site staff as they deem necessary, and contact is sporadic.

3.6.1 Mobilization

The technical assistance team assists the GOP and USAID in implementing the CWM on a pilot basis in seven subproject areas. Specifically, the TAT is to work in the areas of institutional development, training, water management improvement, physical improvements, and monitoring and evaluation.

Although CWM was officially inaugurated in July 1985, the TAT did not arrive on site until early 1987.

The TAT's late arrival reportedly was due to a delay in USAID's awarding the contract. The successful bidder for the provision of these services also experienced considerable difficulty in mobilizing a team to provide the services. For example, none of the nine expatriate experts originally proposed were available after the contract had been awarded, and a time-consuming recruitment drive needed to be relaunched.

Civil works had already started in late 1985. Thus, a functional CWM -- including the FCC, SMOs, line agencies, and regular meetings of SCCs and PPCs -- was already in place prior to the team's arrival. The TAT feels it had little opportunity to contribute toward the development, organization, and operation of these setups, although it might be questioned what

role it might have played since the establishment was specified by the project documentation.

3.6.2 Institutional Relationships

Under the terms of the contract, the TAT is directly responsible to A.I.D., while the local supervisory consultants are responsible to the FCC. They both are supposed to assist the SMOs, to whom they have no obligation. A more conventional and desirable arrangement would require the consultants to have some accountability to the SMOs, as these are the units for which consultant support and assistance is primarily intended. The TAT should report to FCC and FCC should exercise effective control on all consultants, with regular feedback from the SMOs.

3.6.3 Major Activities To Date

Training

The TAT was expected to play a central training role for SMO and other line agency staff, and for farmers. Only limited training has occurred, reportedly because of difficulties in designing appropriate programs and acquiring the necessary approvals. The TAT has trained a few SMO staff and line agencies in water management and extension services, and a computer programming short-course has also been given. An expanded training program is expected to emerge with the recent addition of a full-time expatriate training adviser.

Water Management Improvement

The TAT is charged with supplementing the efforts of WMS-II by assisting the SMOs with designing, testing, and disseminating operational water

management plans. One such plan was to be prepared for each SPA. The TAT prepared a computer program for preliminary use on 6R-Hakra, demonstration plots have been established, discharge observations have been made on channels and watercourses, and baseline data has been collected. Although these are all ingredients of the intended operational water management plan, such a plan is yet to be prepared and implemented.

Monitoring and Evaluation

Several different M&E activities have been undertaken, including data collection on 25 watercourses in Punjab and 5 in NWFP, and three reports (one by an SMO without TAT involvement). These efforts are disjointed and bear little direct relation to establishing the impact assessment capabilities discussed earlier.¹ Moreover, some of the other M&E activities specified in the project documentation have been less useful than desired.

3.6.4 Constraints

After 19 months on site, the TAT has not significantly affected several of the project objectives and goals. Some of the probable reasons follow:

- The TAT remains on the periphery of the civil works and is not integrated into the project's mainstream.
- Staffing in the SMOs' Water Management and PM&E units is inadequate as is the interest in extension services throughout the project generally.
- There are differences of understanding concerning the TAT's role vis-a-vis its Pakistani counterparts. The TAT has indicated in writing

¹ The TAT has commented on an earlier draft of this report that "...a great deal of data was already gathered for M&E in Punjab and NWFP and analysis was in progress...at the time of the evaluation. The evaluation team has not acknowledged this." The team had been informed of this, but had been unable to assess the relevance and/or utility of these efforts, and therefore felt it appropriate to omit mention of them.

to USAID that its only role is to assist the SMOs, which are presumed to know what is needed and to have staff available to do the work with only advisory assistance from TAT personnel. This perspective leaves the TAT outside the project implementation loop when such local vision or capacity is lacking. An alternative perspective would have the TAT support existing capacities to promote experimentation and new efforts to develop greater capacity.

- The TAT leader considers USAID to be the team's only significant client, and USAID therefore is the only entity that needs to be kept satisfied by the contractor's performance. In the absence of a relationship that makes the TAT responsible to some entity in the GOP authority chain, the team will continue to experience difficulties in becoming better integrated into the process.

3.7 Constraints in Institutional Development

CWM's attempt to foster coordinated and collaborative working relationships among the line agencies involved in irrigated agriculture is said to be the first such effort in Pakistan's history. Institutional development is invariably a slow process, especially when the decades-old, entrenched systems must be changed. Institutional development of the type envisioned in the CWM project documentation cannot be measured over short periods. Nonetheless, change may be beginning, in the coordinated working of line agencies and the increased involvement of farmers in planning and decision making.

Difficult challenges are inevitable when measuring institutional change, and design deficiencies in CWM make this problem especially acute. Although CWM's implementation structure was expected to remain in place throughout the project life, the question of the ultimate institutional configuration for integrated irrigated- agriculture management in Pakistan was left undefined, as was the process by which it would come to be defined. The assumption was that this configuration would emerge from the project experience. Given the complexity of the undertaking, this may have been a reasonable position to take.

A consequence of this assumption, however, was that the CWM design did not incorporate specific indicators of project success with respect to its

institutional development objective. CWM adopted the position that if the other project elements accomplished their goals and objectives, institutional development would have done so as well. This posture creates some difficult challenges both for those concerned about measuring progress toward achievement of this objective and for those who are ultimately responsible for assuring that the project objective is met.

CWM objectives in institutional development are defined in the IDA's April 1984 SAR and, in more detail, in USAID's January 1985 PPA. These objectives should have been reflected in the federal and provincial PC-I proformae, which provide the official GOP project implementation guidance to line agencies. This was not done, however, which has important implications for project implementation.

CWM's PC-I for the Federal Cell identifies project objectives in terms of institutional inputs, including training, water management needs, physical outputs, and monitoring and evaluation. It fails to discuss what is expected in institutional development or how it is to be achieved. Similarly, PC-Is for Punjab and NWFP refer only to the project objectives stated in the SAR; the PC-Is for Sind and Baluchistan do not even mention these objectives. The dominating thrust of all provincial documentation is on physical targets of canal lining, watercourse improvement, drainage, and PLL. The only nonphysical elements mentioned are WUAs and personnel training, but only in terms of the output targets. There is no discussion of institution building, water management, and nonwater inputs, or of their relationship to project priorities.

Such deficiencies in official guidance strongly affected the thinking of the provincial officials and project implementation personnel concerning the project's priorities. To then, CWM met the achievement of physical targets, especially civil works. Even during the evaluation team's visits, officials always talked of SAR output targets and rarely mentioned the stated thrust and noncivil-works objectives of the PPA. This distorted perception of project objectives is a major reason for neglect of the project's institutional development mandate.

3.8 Conclusions and Recommendations

- Dialogue among principal actors remains sporadic and largely undirected. Too much of

it focuses on issues relating to civil works, reimbursement procedures, etc. While these issues are important, a concerted effort is needed now to put outstanding disputes (e.g., percentages of watercourse lining or FAR reimbursement procedures) behind, or to at least agree to occasionally set those issues aside in order to consider the institutional development objectives of the project.

- Despite commitments to the CWM concept at the highest and lowest levels, a large sector in middle management remains uncommitted. CWM will require changes in traditional roles and relationships at these levels, and these changes will be met with resistance for innumerable reasons, some of them legitimate.
- Although the commitment to the successful completion of project civil works is clear among concerned GOP personnel, it is less clear whether that commitment extends to the institutional and social development concepts and objectives upon which CWM is based. The glue that holds CWM together is, in many ways, the project funding being made available that largely relates to civil works. Once that funding ends, it is questionable whether any progress made toward achieving the project's institutional development objectives will be sustained.
- The performance of the FCCs and PPCs has generally been satisfactory, although in some provinces they may wish to consider giving the SMOs more authority on staffing and in dealing with line agencies and consultants. SCCs have been doing useful work preparing and implementing work plans and trying to solve farmers' problems. However, the committees become helpless when government policies place limitations on their working, e.g., credit policies, additional lining, extension services, and nonwater inputs. SCCs need continued policy support from the GOP, PPCs, and donor agencies to assure their effectiveness. Further, the SMOs should hold SCC meetings in the project areas and not in their offices, to promote a sense of participation by the farmers.

- The SMOs have been especially effective in coordinating the civil works activities. The offices have been less effective at coordinating improvements in water management, nonwater inputs, and monitoring and evaluation. SMOs have limited authority over project personnel and no control over line agency budgets for CWM activities. The SMOs also have been constrained in experimenting with and implementing the noncivil-works components of CWM, by the absence of directives concerning the importance of such activities, guidance regarding how to proceed, adequate personnel to effectively pursue these objectives, and funding to support relevant activities.

Still, the formation of SMOs and the limited progress made under unusual circumstances are creditable. The offices need further strengthening and more support from the GOP, PPCs, donor agencies, and TAT. CWM needs to understand the development of the SMO models in the provinces and to monitor and document the evolution of these different models as an aid to determining how to sustain the CWM concepts following project completion.

- The TAT and the SMOs need to integrate both their efforts, which will require a fuller understanding by the SMOs of the institutional and other noncivil-works objectives of the project. It will also require mutual exploration, monitored closely by the FCC, of ways in which the SMOs and the TAT might better identify and pursue activities that support project objectives. To that end, there should be only one workplan for each subproject area, combining SMO, TAT, and all other anticipated project activities. The preparation of separate and, frequently, mutually exclusive work plans by the SMOs and the TAT is an inappropriate procedure and should be discontinued. The SMOs and the TAT should also agree upon and implement a means for better physical integration of their various activities. The separation of the two TAT offices in urban centers far distant from all subproject sites does not serve the project's purposes.

4

WATER USERS ASSOCIATIONS AND FARMER PARTICIPATION

4.1 Approach and Achievements

CWM seeks to develop and test strategies and to formulate replicable models that promote continuing farmer participation in water and nonwater management. After nearly a decade, under OFWM, of a heavy "top-down" approach in forming water users associations, CWM was expected to be more reflective and experimental. The OFWM Program did succeed in registering water users into legal entities for watercourse rehabilitation. However, it failed to create entities sustainable beyond the construction period. The WUAs did not serve as mechanisms for channeling individual actions into more forceful and organized group initiatives for water and nonwater services.

CWM was designed to enable WUAs to carry out expanded roles and responsibilities, as provided in the existing legislation. The primary objectives of WUAs are the operation, maintenance, improvement, and rehabilitation of watercourses; improvement of water supply from surface or groundwater; and improvement of on-farm water management.

Following three years of project implementation, little evidence exists to confirm or deny that WUAs offer any promise for improving farmer participation in decision making. Institutional development efforts with WUAs have focused on credit facilities, demonstration plots, and agricultural inputs, and have treated water-related services as marginal elements. However, these efforts to strengthen WUAs have neither succeeded nor been sustained, even for short periods of time.

CWM's concentration of resources on the physical improvement of watercourses has seriously handicapped the implementation of other project activities. Nor has the project made effective use of its limited resources. The watercourse lining program and the agricultural extension efforts are not used as incentives to encourage greater farmer participation. CWM offers farmers a package of

participation and show no obvious relationship between participation and increased productivity or income. Greater thought is needed in making the watercourse renovation program an effective entree for community organization, and then in designing follow-on activities that can sustain the interest and cohesion of the WUAs.

CWM has undertaken various initiatives in working with WUAs:

- registration of WUAs--of the 1,050 watercourses targeted for improvement, 955 WUAs have been registered: 542 in Punjab, 344 in Sind, 50 in NWFP, and 19 in Baluchistan;
- registration of about ten WUAs as cooperative societies in NWFP and Pakpatten (Punjab), with loans made to two WUA cooperatives benefiting 25 farmers in the NWFP;
- joint purchase of agricultural inputs by 25 members of two WUA cooperatives in NWFP;
- formation of a canal committee in 6-R/Hakra, with five members nominated by local political leaders, and a minor task force in Pakpatten;
- demonstration plots and farmer days;
- SCC meetings;
- participatory pilot watercourse (PPW) in NWFP; and
- selection of PPWs in Sind and Lasbela.

4.2 Organizational Structure

The CWM design documents provide a framework with organizational elements, rather than a program

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with approaches and schedules. The SPMs are expected to develop and adapt location-specific models. WUADs work in the field with farmers and organize them into WUAs. OFWM provides the catalytic intervention of watercourse renovation, through which farmers become energized into collective action. The SMOs play a coordinating role in organizing follow-on water and nonwater activities for WUAs. Continuous monitoring and refinement of WUA activities and models are required by the TA team, WUADs, and the PME units.

4.2.1 Subproject Management Offices

The formation of SMOs has improved farmers' access to government officers and representatives of banks and input companies. This is the first government forum that encourages farmers to present problems. WUA members in Sind and Punjab said that the SMO is an improvement over their past dealings with government officials. Although few could cite specific examples indicating how the SMO had settled a problem, members believed they had greater access to the line agencies than ever before. In the Punjab, the SMO has played a unique role in resolving watercourse disputes through a petitioning system.

4.2.2 Technical Assistance Team

The TAT extension specialists face serious constraints in their assignments. By the time the TAT arrived, two years after project inauguration, patterns had already been established that emphasized the civil works aspects of the project. The SMOs still do not understand institutional aspects of the project and have yet to effectively design or implement them. WUADs positions have not been filled with qualified personnel in timely fashion. There has been no clear alternative counterpart staff, as with the other TAT members. In March 1988, one of the extension specialists was terminated and not replaced until June, which further delayed implementation.

In CWM's early stages, work in each of the provinces followed uncoordinated strategies. In Baluchistan, the approach paralleled OFWM's: it lacked a strategy to select water users or involve them substantively in the improvements. In Sind, demonstration plots were required that did little to bolster a sense of decision making. The Punjab continues to lack any identifiable program, although the SMO used SCC meetings to improve farmer

access to information and services. Until recently, NWFP activities with WUAs were limited largely to credit efforts.

With the arrival of a long-term replacement, the extension specialists have now conceptualized and begun to implement a systematic approach to strengthening WUAs. This is a promising shift from earlier unsystematic and ineffective attempts.

The TAT's Master Work Plan indicates that the extension specialists will survey selected established WUAs in order to assess relative past performance. The progress reports fail to mention this activity and no evidence suggests that it was undertaken or completed, although it would be a useful project exercise.

The extension specialists must establish an ongoing monitoring program for WUA development, in collaboration with the WUADs and the PME units. There have been a number of efforts to work with associations: WUA registration, CWC, demonstration plots, participatory pilot watercourses, cooperative society formation, joint marketing of inputs, commercial bank loans, and canal committee formation. However, there appears to have been little or no consistent or project-usable documentation of these efforts. Furthermore, no mention is made in either annual workplan or progress report of an intention to monitor future WUA development.

4.2.3 Water Users Association Development Specialists

The WUADs have an ambiguous place within the SMO, since they are recruited and paid by USAID. There is disagreement about whether their primary supervision lies with the TAT or the SMO. Set apart from the SMOs, the WUADs have also been isolated from each other. Although the two WUADs did meet twice in twelve months, there has been no program of regular meetings or visits to subproject sites. Apart from the specialist in Lasbela, WUADs meet with the TAT only during site visits. This isolation has led the WUADs to develop individual approaches to the work, without the benefit of the TAT or each other.

Problems with WUADs recruitment have caused delays in project implementation. Only two of seven WUADs positions were filled by July 1988. The WUAD in Warsak began in March 1987, and roughly a year ago a WUAD began in Lasbela.

Three more staff joined in August of 1988, and it is too early to assess their progress.

The recent recruitment of three more WUADs is a promising sign for a revitalization of the WUA program. However, they remain structurally outside the GOP and a carry-over of their activities into the line departments looks doubtful. The SPMs should make every effort to recruit an additional cadre of field assistants from OFWM to work full-time with the WUADs during the remainder of the project. Initially, one FA for each WUAD would be adequate. As the agency responsible for both watercourse improvement and water management extension, the OFWM program should ultimately incorporate the responsibilities of the WUADs.

4.3 Alternative Approaches

4.3.1 Lessons Learned and Model Replication

Due to the absence of any monitoring and evaluation program for WUA strengthening, it has been difficult for the SMOs and the TAT to determine what lessons have been learned and how those lessons might be reflected in future project activities. No hard data exist on WUA strengthening and no reports have been prepared that can receive wider distribution among the different SMOs. As a result, efforts are repeated with few modifications. A canal committee will be organized in a Punjab command using basically the approach introduced earlier in another provincial command, with no verifiable evidence that the earlier effort had achieved its objectives. Similarly, the joint purchasing of agricultural inputs in NWFP, which initially failed to be carried over into the next season, will be tried again, this time more broadly.

Conceptualizing and learning lessons from earlier efforts require a careful monitoring of activities, so that behavioral, organizational and structural changes can be identified and understood. When efforts to monitor experimental initiatives are inadequate, assessments become impressionistic, experimentation becomes haphazard, and program improvement becomes more difficult. Comparisons of varying solutions to comparable challenges would be a reasonable strategy for a pilot project if participants monitored the activities closely to determine failures and successes, in order to modify plans. This has not happened with the WUA-strengthening program.

4.3.2 Alternatives from Other Pakistani Experience

Although TAT members indicate they have no knowledge of attempts within Pakistan to use participatory approaches and SMO staff have little familiarity with such efforts anywhere, two well-known Pakistani NGOs practice such approaches and continue to flourish: the Aga Khan Rural Support Program (AKRSP) in Chitral, Gilgit, and Baltistan, and the Orangi Pilot Project (OPP) in Karachi. In Asia, national programs concerning irrigation associations in the Philippines, Thailand, and Sri Lanka merit attention. Prior to the arrival of the second Karachi-based extension specialist, the TAT appears to have been unfamiliar with these Asian experiences, despite the wide literature available. No attempt was made to adapt and develop a participatory approach in WUA-strengthening programs. The new extension specialist is a Filipino who assisted the National Irrigation Administration (NIA) to develop its participatory program in the late 1970s and brings first-hand experience to CWM. Some SMO and line agency staff have visited NIA and other agencies in Asia through CWM, but they did not initiate the approach as a result of their observation tours.

NIA's work in developing national and communal irrigation systems through the participatory approach also has special relevance for CWM. However, care should be taken before attempting to adapt the NIA model to Pakistan's conditions.

4.3.3 The Participatory Approach

The CWM initiative in the NWFP subproject area focuses on improving participation during watercourse improvement by giving farmers a role in the survey and design. Introduced by the Karachi-based TAT extension specialist, the approach builds upon the Philippine experience in creating irrigation associations. The objective shifts from merely meeting civil works targets to improving communication between the water users and the government and jointly identifying and agreeing to the users' role.

Although it is too early to tell whether behaviors adopted during participation in watercourse improvement can shift into other areas of group action, the returns from integrating this approach into the OFWM unit activities look promising. A

higher level of enthusiasm was evident on the watercourse than on any of the other subproject areas that the evaluation team observed. In general, the approach has consequences for the lead-time between initial visits and the beginning of physical works; it is likely to be substantially lengthened. Preconstruction organizing of water users is greatly emphasized.

Other experimental programs ought to be explored during the initial period of WUADs visits, shareholder meetings, and registration, including group savings for construction, maintenance, and repair; creation of a maintenance plan prior to construction; and design of a water management extension program. The selection of activities and the dimensions of those efforts ought to be decided in active collaboration with water users.

Initially, WUADs of the NWFP met individually with every water user and discussed the program in detail, including the required contribution from each side. Unlike many watercourses visited during the evaluation, farmers here correctly understood the terms of the agreement with OFWM. Four well-attended group meetings preceded the survey, which was overseen by two-thirds of the WUA members. The effort is now moving into the design phase. The members expect to play an active role and intend to review and approve the plans before submission to USAID. A relatively small investment in project time has already significantly increased farmer participation.

4.4 Conclusions and Recommendations

4.4.1 Output Indicators for Measuring Success

The WUA-strengthening program continues to emphasize water-user registration and rapid improvements on watercourses. The project documentation reinforces this approach and OFWM perpetuates it. It provides a number of outputs specified for CWM, which, if produced, "will achieve the project purpose." Among these outputs is the establishment of over 1,000 formally organized and registered WUAs in the seven project areas. The appropriateness of requiring such a large number of WUAs for an experimental pilot project is doubtful. Project success is then measured as OFWM measures its own, although CWM is supposed to move imaginatively beyond this approach. The

project should focus more on producing successful models that have been tried and replicated within the subproject areas and can be promulgated more widely in future efforts. Measuring success by merely counting the number of WUAs registered prior to inaugurating canal-lining work, as required by law, runs counter to the spirit of the project. Easily quantified activities (number of cooperative societies formed, number of cooperative bank loans, number of commercial bank loans, number of joint purchase efforts, etc.) then dominate project thinking.

It is not surprising that differences between organized WUAs and operative WUAs are glossed over as trivial. CWM should be judged, with respect to its participation objective, by qualitative gains made in strengthening WUAs. Unless these gains are identified and agreed to by all parties, CWM is unlikely to have programs or models thought to be worth replicating in any follow-up phases to the project.

The TAT extension specialists should take the lead in discussing desirable and achievable goals with SMO and line department staff, other members of the TAT, and USAID personnel. Based on these discussions, a list of reasonable output indicators should be drafted for review and approval. Until this is done, CWM's efforts in WUA development will continue to be directionless. The indicators should serve as the basis for an ongoing internal monitoring and evaluation effort. The indicators should deemphasize counting and emphasize processual changes. Initial output indicators might include the following:

- WUA design, approval, and supervision of watercourse improvements;
- WUA savings for watercourse construction, maintenance, repair;
- WUA agreement on and implementation of a watercourse maintenance plan;
- WUA design with the SMO and TAT of water management and agronomic extension packages with low-cost inputs and no-cost techniques;
- adoption of the extension program by WUA members;
- increased incomes for farmers;

- adoption by WUA members of new project-sponsored models; e.g., agricultural technology, water management, cooperative credit, or cooperative purchases;
- public accountability of WUA executive committee members and a more equitable distribution of project resources and information than has been evident to date;
- resolution of water-related conflicts within the WUA rather than by the SMO or PID; and
- WUA initiatives in coming up with their own models, or their own solutions to old or new problems.

Several of these activities, such as savings and maintenance plans, should be treated experimentally within the participatory approach. If sufficient success is achieved, these activities should be a mandated part of the OFWM watercourse improvement program during CWM-II. Given the project's difficulties securing and sustaining nonwater services for water users, the advisability of their inclusion as output indicators ought first to be given careful attention.

4.4.2 Monitoring and Evaluation

The WUADs, TAT, and the PME units have failed to establish a monitoring program for WUA development or to conduct any data collection. There has been no attempt to examine or analyze approaches used for model development. The only planned data collection is a survey of associations prepared by the TA team, which is unlikely to provide particularly useful information on process and change. The survey asks broad questions about water user association and development, but does not address specific project efforts. Actually, each type of CWM strengthening effort requires an independent monitoring design, tailored to its objectives and field program. Initially, outputs ought to take the form of case studies.

The TAT extension specialists should present a detailed plan for an ongoing monitoring program for WUA strengthening (including methods, personnel, qualitative and quantitative indicators, and data requirements). According to the PPA, WUADs have the primary responsibility for monitoring issues

related to WUA development. WUADs are to rely heavily on the PME units of the SMOs to record and analyze information and to be assisted by the TAT extension specialists. Given the status of the PME units and the experience of the WUADs, short-term lead responsibility falls on the extension specialists.

Process documentation needs to be understood by the GOP and operationalized. WUADs and the TA team, in collaboration with the PME, should collect data on efforts to organize cooperatives, encourage joint purchasing groups, hold demonstration plots, register farmers into WUAs, and create canal committees. Changes in farmer-participation levels, complaints, or requests at SCC meetings should also be recorded. Data collection is also required on recent attempts to integrate a participatory approach into the watercourse improvement program. Project staff should examine current irrigation practices, maintenance mechanisms, labor sharing, and conflicts or social organizational ties among WUA members. These various interventions with farmers represent the CWM program for WUA strengthening, but inattention to subtle changes in farmers' behavior will leave the project unable to analyze these approaches or elaborate a model for possible replication.

Each type of CWM effort to strengthen WUAs requires an independent monitoring design, tailored to its objectives and field program. Initially, outputs ought to take the form of case studies. In a short time, comparative papers should be produced, which will take a more analytical perspective and begin to formulate approaches for replication. The project will experiment with numerous specific models, some of which will fail, while others may have replication potential. Continuous monitoring of these model-building initiatives will help the SMOs make course-corrections during CWM, and should contribute to the design of any CWM-II.

4.4.3 Expansion of the Participatory Approach

The participatory approach needs further expansion. Initially, each WUADs should handle five watercourses simultaneously. Adjustments in the participatory approach will need to be made in the lead-time and in the introduction of related services by the subprojects. The lead-time will likely need to be shortened, and planning for other services will

need to be introduced during initial visits. Modifications require field testing.

Other experimental programs should be introduced during the initial period of WUADs visits, shareholder meetings, and registration, including group savings for construction, maintenance, and repair; creation of a maintenance plan prior to construction; and design of a water management extension program. The selection of activities and the dimensions of those efforts should be decided by the shareholders themselves.

The Punjab SMO has not yet accepted this participatory method, and while the SMOs in Sind and Baluchistan have agreed in principle to use the approach on a trial basis, staff seem unfamiliar with the method or its implications for meeting civil works targets. The TAT should present this new approach to the SMOs through a series of subproject workshops, discussing their findings from NWFP and the meaning and application of the participatory approach. Such meetings might be an effective method of gaining their commitment. Workplans should be developed by the SMOs and TAT on the basis of these meetings.

The 1988-89 SMO workplans fail to mention the participatory approach. The effective use of this approach in CWM requires that the SMO and the TAT immediately, and jointly, prepare detailed workplans for each subproject area. The plans should include objectives, achievable targets, personnel required, time frame, resources required, training plan, relation to other CWM efforts and a scheme for integration, anticipated outputs, and a plan for ongoing monitoring of the activity (method, personnel, qualitative and quantitative indicators, and data requirements).

4.4.4 Program Development and Integration

CWM has developed no WUA programs that either build upon the limited project resources or grow out of farmers' identified needs. Project activities have been treated as discrete elements with little logical organizational connection: extension activities are not designed to follow upon gains made during the construction phase, and attempts to organize WUA federations do not build upon successes with coordinated watercourses. A conceptual gap still exists between the participatory watercourse program and other project activities. The participatory approach should be thought of as the starting point

for all other project efforts, not as merely another approach grafted onto the numerous others.

CWM has employed two strategies for nonwater services: widespread demonstration plots and assistance in securing credit. CWM has limited resources in nonwater activities, but it has not adequately leveraged those that it does have to support group cohesiveness. Demonstrations on individual farmers' land have not been clearly linked with WUA collective decision making or action and do not reinforce a sense of group membership or purpose. The demonstration packages are uniform within subproject areas and largely similar among the provinces. There has been little or no farmer participation in determining their design.

4.4.5 Credit Program

Inordinate time has been spent securing credit facilities. The program was easily undermined by a federal-level change in interest policy, which indicates the limitations of concentrating on efforts outside the project's resources or control. Given the difficulties in securing and sustaining nonwater services for water users, the advisability of the project's retaining these services as important program components should be given careful consideration.

4.4.6 WUA Federations

USAID's Project Paper Amendment provides a strategy for introducing project activities within each subproject area. Each year, the SMO was to focus on a particular minor or distributary command. WUA formation was planned to proceed sequentially among all watercourses within that area. Once this was done, CWM was to develop a network of WUAs into a federation. The federations would meet at least quarterly. Representatives from all federations would eventually form a WUA council covering the entire command. CWM has attempted to pursue this strategy only in the Punjab, where such federations have no legal status.

The creation of WUA federations in a context of short-lived WUAs is, at best, questionable. Plans for the creation of federations have been linked to a participatory watercourse approach or to other programs that would give the project some leverage. There is no indication in project planning or implementation that the SMOs and/ or TAT have

made use of the PPA's sequential approach. If CWM intends to proceed with federating associations, the project will need to conceptualize a plan to better integrate the effort into CWM's other activities.

4.4.7 CWCs and Demo Plots

The CWCs are of questionable utility for advancing project objectives. Few in number, the CWCs concentrate too many project resources in too small an area among too few people. The package elements are too numerous to be repeated by most farmers. An emphasis should be placed on low-cost water management inputs and (preferably) no-cost water management techniques, which can be introduced in packages of two or three. With the farmers participating fully through the WUAs in determining the nature of the packages used on their land, more packages could be introduced, with better coverage and more effect on a single watercourse. An emphasis should be placed on raising farmer incomes.

4.4.8 WUA Participation in SCCs

SCC meetings offer the best opportunity for improving farmer access to government officers and representatives of public- and private-sector agencies. In most of the provinces, the meetings are formal occasions held in the SMO. The approach initiated by the Punjab, whereby SCC meetings were held in the command to encourage farmer attendance, should be adopted elsewhere.

4.4.9 Need for WUADs-OFWM Collaboration

Although the recent recruitment of three more WUADs is a promising sign for the WUA program, these positions remain structurally outside the GOP. The responsibilities of WUADs should be incorporated into the functions and operations of OFWM. However, there may be insufficient time remaining in CWM to develop the capabilities and understanding required in the SMOs and OFWM. Most of the WUADs have just started working on CWM, and the participatory approach is barely being implemented. USAID and the GOP may want to consider keeping the WUADs on for an extended period, slowly easing into a complete take-over by OFWM at an appropriate later stage. A training program for AOs and FAs in the participatory approach must be developed (perhaps requiring a

special TDY preceding any CWM-II design) and integrated into the CWM scope.

4.4.10 WUADs Training

Training in WUA development has been limited, and has largely focused on the WUADs. The WUAD in Lasbela received training in farmer-organizing practices. The WUAD in Warsak was trained in a three-day structured workshop. A recent three-day training session in Karachi, which included the WUAD from Lasbela and the WUAD and the social scientist from Sehra/Naulakhi, excluded the one in Warsak. The second annual progress report indicates that training in rural organization will progress slowly, with clusters of two or three WUADs trained separately. It is disadvantageous to separate the WUADs into small groups for training.

Regular WUADs interactions should increase. Their work on PPWs and CWCs in many of the subproject areas provides WUADs an opportunity to visit each other's sites and explore common or divergent strategies. CWM ought to introduce a variety of approaches to strengthening farmer participation that reflect local socioeconomic conditions. Initially, the extension specialists and the WUADs ought to meet every two months for three to four days in a different subproject area. The WUAs need to articulate their approaches and results systematically. Priorities, strategies, achievable targets, schedules, and anticipated outputs should be identified and agreed to during the meetings. These planning concepts will likely need to be modified in subsequent quarterly meetings, when results are presented.

During these meetings, presentations on efforts at the different subproject areas (with appropriate audio-visual material) should be made to the SPM and SMO and line department staffs, so that they might be better integrated into the activities and learn about CWM activities beyond their subproject areas. These presentations may facilitate the adoption of models used elsewhere by the SMO or stimulate interest in adapting them to local conditions. At present, SMOs know little of what is happening in other subproject areas.

A "Field Action Manual for WUA Development" has been prepared by the Lahore-based extension specialist. The version thus far is theoretical and will be difficult to apply. Short case studies of actual CWM efforts should be integrated into the text to give it a local context and greater relevance. The

5

WATER MANAGEMENT TECHNIQUES

5.1 Benefits of Watercourse Renovation

Watercourse renovation through CWM civil works has generated considerable enthusiasm among farmers. Farmers invariably reported the following benefits from watercourse improvement and lining:

- reduced water losses and, therefore, a greater amount of water available at the field level, particularly for tail-enders. Farmers reported this effect by estimating the number of acres that could be irrigated, both previously and now, in the time allotted to them. These farmer estimates suggest a significant increase in cropped area, most of it in the kharif season as a substitute for fallow.
- reduction (due to increased velocity) in the silt deposited in watercourses, with a corresponding decrease in routine maintenance requirements. It appears that the benefits of this labor saving have accrued disproportionately to those located in the head reaches, since those located in the unlined lower reaches have exclusive responsibility over "their" portion of the watercourse.
- reduction in the effort needed to convey irrigation water from the watercourse to the field, with a corresponding decrease (significant for tail-enders) in the time and skill needed for irrigating crops. Some tail-end farmers reported that where two adults were needed previously, now one adult or even a child could do the job.
- reduction in water theft due to pucca outlets (which regulate discharge) and lining (which prevents illegal diversion from the banks of the watercourse). Theft reduction has decreased social tensions.

Some farmers also reported that nutrient-carrying silt previously deposited in watercourses is now carried by the velocity of the water to the fields; this silt could be beneficial if compensating changes in

agricultural practices (e.g., higher seed rates) were made.

There are no quantitative data within the project on the costs and benefits of watercourse lining and alternative ways of improving conveyance efficiency. Concurrently, the expected positive effect on crop yields is not yet observable with any reliability.

Contrary to the perspective currently dominating CWM, watercourse renovation activities must be viewed as a means to an end, not as an end in themselves. While important, these works can only assure a more reliable and equitable delivery of water to command areas. More water in the commands can lead to greater agricultural productivity by enabling more land to be cultivated, and this would be desirable. However, more water does not guarantee improved water management or higher agricultural productivity. Because improved water management in the commands and on the farms can substantially contribute to increased agricultural production, more water presents both opportunity and challenge for improved water management. This is a challenge CWM is obliged to address.

5.2 Organizational Structure for Improved Water Management

5.2.1 SMO Water Management Units

Within each of the four SMOs, a water management unit (WMU) was to be established to develop alternative water management plans, implement these plans at various watercourses on a pilot basis, and then evaluate their success in order to determine which plans would be worth replicating over a larger area. Project documents specify that these units should have at least five persons: a chief, computer person, draftsman, and two sub-engineers. Unit staff are to work in the field collecting data, carrying out water measurements and investigating field conditions. The evaluation team found that in practice all of the WMU's are short of staff.

manual needs an actual program with objectives, priorities, reasonable targets, schedule, methods, anticipated outputs, and a concrete design for monitoring and evaluation. A more useful document, the April 1988 TDY trip report on recommended strategies for strengthening WUAs, written by the man who ultimately was appointed to the long-term TAT extension specialist position in Karachi, has not received general distribution. The report should be made available to all WUADs.

4.4.11 Water Users Training

No farmers have yet received training under any program designed or implemented through CWM. A program should be developed and instituted immediately that includes skills transfer to reinforce the participatory program, making farmers better able to play a supervisory and decision-making role. During the period of physical construction of the watercourse, farmers should play a more informed role than they have in the past.

Short seminars in simple accounting, quality-control management, and blueprint reading would be the most appropriate initially. Visits to another completed watercourse, where they may compare its blueprint with the physical structure, would help users visualize the plans for their own watercourse. The program may have to be limited to the PPWs initially, but should be done on every improved watercourse. While the program is being developed, the WUADs ought to be able to do the training themselves, with proper assistance from OFWM. Eventually, OFWM staff should conduct it.

4.4.12 Uncompleted Watercourses Study

The study of uncompleted watercourse construction in the Punjab, which the SPM requested, is worthwhile and should be encouraged. The extension specialist is advised to provide the SPM with a proposal for the study, indicating objectives, methodology, collaborators, time frame, TAT and SMO resources required, and a preliminary list of questions to be explored. A detailed design would likely instill confidence in an SMO staff accustomed only to survey research and dispel the impression in the SMO that the extension specialist is unresponsive to its requirements and requests.

ought to be considered for short-term TDY to CWM to help the TAT and SMOs further develop and implement the participatory program. Other local experts could prove similarly useful in expanding the thinking of project personnel and helping provide project guidance and direction.

4.4.13 Reviewing Other Programs

Available alternatives for farmer participation exist both in Pakistan and elsewhere in the region. Some of the programs focus directly on irrigation development and are particularly relevant to CWM. SMO and line agency staff, the TAT extension specialists, and the WUADs should visit AKRSP and OPP to review other programs that employ a participatory approach. Initial visits might be made by TAT members, who could then develop an observation tour agenda with AKRSP and OPP staff.

Dr. Akhtar Hameed Khan, considered the father of rural development in Pakistan, is the moving force behind OPP and a senior advisor to AKRSP. He

The output expectations of these units were as follows:

- an irrigation system operational plan developed for one subproject area that will permit optimum use of surface water and both public and private tubewells;
- a detailed methodology developed that can be applied to other irrigation command areas for deriving an irrigation system operational management plan;
- irrigation system operational management plans for the remaining six subproject areas, based on methodology noted above;
- approximately 1,000 farmer-implemented on-farm improvement programs completed;
- approximately 1,000 agricultural demonstration plots, one in each rehabilitated command area, established;
- precision land leveling completed on about 20,000 acres; and
- field testing completed and evaluated in several subproject areas of such irrigation methods as pipelines, sprinkler or drip systems, small reservoirs, and tubewells.

5.2.2 Technical Assistance Team

The WMUs were to be supported and assisted by the TAT water management specialists, who were to identify, design, test, and implement improved water management practices on an experimental basis. While farm extension personnel of the Agriculture Department were to assist these efforts as appropriate by introducing nonwater inputs, the primary focus of the WMUs and the TAT specialists remained on water and its effective management, within the following specific contexts:

- regulation/control--measurement devices were to be installed to monitor changes in flow, and consideration was to be given to the possibility of gateing moghas;
- private tubewells--policies and incentives were to be prepared to ensure that farmers with

private tubewells would meet peak demands and that public tubewells would be used and maintained properly;

- cropping patterns--changes in cropping patterns were to be investigated to take advantage of excess water supply that occurs at certain times in the year;
- water scheduling--various forms of alternative scheduling practices were to be investigated to determine if improvements could be made;
- physical improvements--improvements were to be made to minors and watercourses, and certain drainage works were to be constructed to improve water availability and waterlogging problems;
- other irrigation interventions--pipelines and drip irrigation systems were to be investigated, as were small on-farm reservoirs; and
- demonstration plots--demplots were to be used to demonstrate the various methods of improved water management that were to be introduced by the project.

5.2.3 Other Agencies

The PIDs, OFWM, and Agricultural Extension all were to play roles, as follows:

- The staff of the PIDs were to be involved in the survey, design, and implementation of the canal system improvements and were to operate the main irrigation system that would control water deliveries managed by the water plans. The PIDs were to be supported by local consultants in the design and implementation of the canal works.
- The staff of OFWM were to be responsible for the survey, design, and implementation of watercourse linings and improvements. They would also be supported by a local consultant.
- The staff of the Department of Agriculture Extension Services were ultimately to be responsible for working with farmers to implement and test the alternative pilot water plans. This would be in conjunction with their normal agronomic activities.

5.3 Project Implementation

5.3.1 Progress Toward Achievement of Water Management Goals

The first annual report prepared by the TAT indicated water management activities in the four provinces:

Baluchistan and Sind Provinces

- Calibration of moghas was carried out to encourage close cooperation among farmers, PIDs, and OFWM.
- A package for designing and implementing an irrigation management plan was developed for use on each watercourse command area.
- A computer program was developed to match available water supply with the existing cropping patterns at the watercourse level.
- A mechanism for considering the conjunctive use of surface water with groundwater was developed and incorporated into the design package.

Punjab and Northwest Frontier Provinces

- Data was collected to allow determination of water delivery in response to crop water requirements.
- Water management extension at watercourse command level was developed to enhance control of water by farmer.
- The impact of project improvements was developed to determine the potential effects of water management.
- A water management plan, to include pipe nuccas, field-level irrigation planning, precision land leveling, and the matching of cropping patterns with available water supply, was studied for the CWC.
- Measuring weirs were installed at the head, middle, and tail of the CWC to allow farmers to assess conveyance efficiency and to plan their irrigation.
- Groundwork was prepared for making samples of irrigation scheduling to meet crop-water

requirements and for considering the possibility of integrating tubewell water supply.

This list of activities is not totally consistent with reports prepared by the SMOs covering comparable periods. The SMO reports reflect most of the accomplishments stated in the TAT reports, but generally the SMO reports claim more modest results. The differences indicate the inadequate integration between SMOs and the TAT, discussed elsewhere in this report.

5.3.2 Assessment of Activities to Date

The following activities were reportedly undertaken to develop plans for introducing and implementing improved water management techniques under CWM:

- Two computer programs have been developed that can match up crop-water requirements with existing water availability. The Lahore program used an FAO publication for crop coefficients and the Karachi program used crop coefficients that are commonly accepted by line agencies in Pakistan. Typical cropping patterns were taken from WAPDA publications.
- Water measurements have been carried out on many watercourses and minors to determine present water availability and to compare actual canal discharges with stated design canal discharges and with canal discharges claimed by the irrigation department.
- Training in water measurement has been given to PID staff and members of the SMO WMUs. Various alternative types of measuring weirs have been obtained and used.
- A weather station has been installed at Shahkot Subproject, and weather stations for the other three subprojects in the Punjab have been ordered. The constructed weather station provides equipment to measure rainfall, temperature, humidity and wind velocity. The information that is obtained from the weather station is considered necessary to compute prevailing crop water requirements.
- A sample design package including design standards and standard structures was prepared by the Karachi TA Team. Blank forms have

been created and provided for the preparation of a water management plan on a command basis.

- A manual for the use of programmable calculators was prepared by the Karachi team.
- A proposal to match up crop-water requirements with water availability on selected water courses or commands in the Punjab was presented to the PID. PID indicated that water supply changes were not possible on a command basis, as the proposal suggested, but that changes at the watercourse level could be made by the farmers as well as changes in cropping patterns.

Through these activities, progress has been made toward collecting and examining the elements required to make a water management plan. Such a plan, however, has not yet been developed, completed, or tried on a pilot basis. Although, the TAT's master plan stated that a water plan would be prepared, it provided no time schedule. The TAT arrived in the spring of 1987, so they have had two crop seasons in which to implement such a plan. If the TAT contract is not extended, only one crop season remains in which they can advise the WMUs on implementing a plan.

Although a variety of water management activities have been undertaken so far, these activities appear to have made no significant contribution toward improved water management in the project areas. Other than the demonstration plots, changes in water management that have occurred appear to be changes initiated spontaneously by the farmers, rather than through project intervention. The changes possibly may have occurred because of discussions with the TA agronomists or from the project's farm extension personnel, but this could not be conclusively determined.

5.3.3 Constraints

The TAT has provided the WMUs with tools to prepare a water management plan, but the WMUs have been unable to prepare and implement pilot water plans on their own. The TAT provided advice, but in the absence of SMO staff commitments to water management issues, stopped short of introducing and implementing plans on SMO's behalf.

Other reasons can be suggested to explain why there has not been greater progress toward developing and implementing water management plans, including the line agencies' strong resistance to carrying out techniques that would improve water management. This resistance arises from the nature of the irrigation system, which is supply-driven rather than demand-driven and does not lend itself easily to water management. For example —

- The PIDs are not directly involved in water management activities. The PIDs' main CWM activity is in implementing the IDA civil works. Their mandate concerns only the supply of irrigation water, the resolution of disputes if any arise, and the repair and maintenance of the irrigation system. If this situation were changed, it could prove highly beneficial to the realization of CWM water management objectives. As a start, CWM's technical assistance team should seek mechanisms that enable it to work closely with the PIDs regarding water management issues.
- The OFWM staff also is not charged to deal with water management issues. The OFWM staff concern themselves mainly with the survey, design, and construction of watercourse lining and improvements.
- Although the extension service of the Agriculture Department is more concerned with demonstration, provision, and management of nonwater inputs, they may be missing an important chance to bring about important improvements to water management on land that has been precisely leveled. Where PLL has been carried out, improved water management techniques, such as the use of rows and furrows, should be introduced to achieve more efficient distribution of the water.

An additional impediment is the severe lack of trained personnel within the WMUs of each SMO to implement water management plans with TAT assistance.

One final constraint to development of a water plan can be attributed to the TA COP's interpretation of the Scope of Work for the TA water management specialists. The COP reportedly directed the TA specialists to prepare position papers relating to water management, but then did not actively push them to assist the SMO WMUs in actually preparing a plan.

5.4 Development of an Improved Water Management Plan

Notwithstanding these constraints, the CWM has a mandate to develop water management plans. A variety of alternatives, outlined below, are available to help achieve this objective.

5.4.1 Models of Improved Water Management

The CWM design documents suggested only one specific model for improved water use, i.e., a fairly large and target-oriented program for precision land leveling. The design then charged the TA team and collaborating government agencies to develop replicable techniques for improved water management. The project has generated numerous ideas for improved water management, but it has not yet developed any operational models that might guide farmers or PIDs with the management of irrigation infrastructure and water. In the absence of operational models, it is impossible to assess the project's actual or likely contribution to improved systems performance for water delivery.

To date, suggestions focus on technical recommendations to maximize the returns of water. Technical criteria are but one part of the kind of models needed if farmers and government agencies are to understand and implement new water management techniques. Affordability and economic payoff are additional criteria if most farmers are to adopt a technique. Institutional arrangements at the government or community level are also important for a technique to become operational. Thus, appropriate technical recommendations must be cast into models that make sense in terms of farmer objectives and the socioeconomic setting.

5.4.2 Precision Land Leveling

Attempts have been made in most of the subproject areas to undertake precision land leveling. In addition, improved (as opposed to precision) leveling has been supported by the Sind SPA, where two PLL demonstration plots have reportedly shown that water will be more evenly distributed over the land due to precise land levels. PLL has been conducted mostly on large farms with a government subsidy. The subsidy is being captured essentially by large farmers, with little recorded impact on farm production and neighboring smaller farmers.

This technology was introduced nearly 10 years ago as part of OFWM, and the case for a subsidized demonstration program now appears weak. It is driven more by bureaucratic imperatives than an objective assessment of costs and benefits or determination of its impact on farmers. The costs and benefits of this technology need to be documented with greater clarity and objectivity. PLL entails not only the cost of machinery for precision leveling, but also, in some cases, the cost of late planting or no planting at all on the land being leveled. Although PLL remains (perhaps prohibitively) expensive, farmers in many areas are already paying attention to good leveling. Nonetheless, for the 24,000 acres that have been reported by CWM to have had PLL, improved water management is now possible.

The project should reorient itself, moving from a predetermined, costly technology to one that appears to have a more realistic chance of being adopted by larger numbers of farmers in the near future, i.e., away from precision leveling and toward improved leveling. The project should understand why some farmers find it beneficial to level their fields more carefully than others, identify the larger set of farmers who might benefit similarly from improved leveling, and clearly demonstrate/communicate the benefits of improved leveling as a cost-effective technology.

5.4.3 Matching Available Water Supplies to Crop Requirements

Computer Models for Farm-Level Improvements

The TA team is working on computer models with which to help farmers use existing and enhanced water supplies more efficiently. These models are directed at resource-allocation decisions confronting the individual farmer.

One of the models compares cropping intensities and farmer incomes under traditional and improved water management techniques. Improved techniques are represented by a large number of water-saving practices and inputs that are then listed as farmer recommendations. The exercise could be refined to identify those two or three new techniques that appear to have the highest payoff for farmers. The techniques could then be tested on farmer-managed plots and the results documented. Recommendations could be based on the results of these field trials.

Although these models may have an analytical role in understanding farmer choices, their suitability as sources of farmer recommendations is questionable: what is optimal in a model may not be optimal for practicing farmers, since a model cannot be expected to replicate farmer objectives and resources with any great accuracy. Since the project is charged with developing replicable techniques for improved water management, it needs to work with an appropriate measure of field-based adaptive research; it cannot take assumptions from the computer and demonstrate them as farmer recommendations. Computer models are the first step in understanding farmer response to different techniques; they yield options for testing, not recommendations for demonstration. Such models and/or informal rapid appraisal can be used to identify a small number of options that have the highest likely potential for farm production. These options should then be field-tested, monitored, and refined or discarded.

Water Management Plan for Watercourses

The CWM design documents did not propose a model for water management at the watercourse level. The project does, however, have a mandate to develop appropriate models involving WUAs. There is no readily available blueprint. The success of appropriate technical plans will depend on the capacity of WUAs to understand and implement a new pattern of water use and exchange. Project management may need to focus its efforts more narrowly on interventions such as those that help farmers overcome peak season water constraints. As a first step, CWM may find it productive to focus on those changes that can be brought about at the watercourse level by the farmers themselves. The challenge is that watercourse-level interventions for water management may require new models for community management of water. These models must be identified, discussed in detail with farmers, and replicated if successful. Project staff have not yet discussed any concrete plans with WUAs.

The project needs to analyze the adequacy of existing conjunctive use of canal and groundwater on a small number of watercourses. There may be an economic payoff for a different pattern of water use and exchange than the prevailing one; if so, appropriate recommendations can be made to water users for their consideration. Each recommendation may entail an institutional change, and farmers will need to discuss this and decide if it is possible to make the necessary changes. Changes may also be

needed in the way farmers currently price their water; again, the project can make recommendations to water users. The project also has to take an experimental approach. As a first priority, the project should consider helping farmers overcome peak-season constraints through conjunctive use of canal and groundwater. Each technical recommendation should be discussed with the WUA in order to bring about any institutional changes that might be necessary.

Irrigation Scheduling Model for the PIDs

Once the civil works program is completed, overall availability of water may not be a binding constraint at all times of the year. Under such circumstances, CWM should find it appropriate to focus on interventions that address peak-season water constraints through water scheduling activities, especially the conjunctive use of surface and ground water.

CWM has no predetermined model of irrigation scheduling. The TA team has developed some thoughts on irrigation scheduling by the PIDs to respond to farmer requirements. At least one PID has officially responded in favorable terms, at the same time requesting a more-operational plan. There is as yet no model that provides the initial rules under which irrigation scheduling could be managed differently. As with watercourse-level changes in water use and exchange, the project needs to start with an experimental approach, monitor its results carefully, and replicate the approach if it is successful.

5.4.4 Irrigation-Agronomy Interactions

Project staff have sought to demonstrate crop/water interactions through demonstration plots that simply add one department's recommendations to those of the other. This has resulted in plots that promote predetermined packages and convolute any significant message that might be targeted at the farmer. Only in NWFP are there separate plots for PLL and agriculture, but these, as well, only demonstrate the predetermined packages of OFWM and Extension Directorates. Thus, CWM has been unable to identify important crop/water interactions for specific locations.

The project should take an integrated approach rather than an additive one, and should involve water and crop specialists in jointly determining a small

number of key interactions that are potential contributors to farm production in the near future. As plans are developed, input from agronomists should be obtained to ensure that the water management specialists' recommendations are compatible with agricultural constraints.

5.5 Conclusions and Recommendations

5.5.1 Water Management Package

Techniques to achieve improved water management have been collected, studied, and identified, but have not been packaged into a specific proposal or action plan for farmers. In each province, water management techniques should be implemented on a trial basis at several project locations that represent a variety of agronomic conditions. Project personnel should--

- develop and implement simple alternative water-management pilot plans for one location in each subproject before next crop season, in consultation with line agencies and farmers;
- evaluate results of trials and select the most attractive plans for replication over a wider area;
- integrate the TAT with SMO activities, and vice versa, and assure that appropriate counterpart WMU staff are available to work with the TAT; and
- more closely integrate the activities of the TAT water management specialists with those of the WMUs of SMOs, in order to assure that water plans are implemented.

More specifically, the TAT water management specialists should--

- prepare and hold frequent technical training workshops for WMU staff in each province; and
- consult frequently with the SPMs, to ensure that proper assistance is being provided to satisfy SMO needs.

5.5.2 Monitoring and Evaluation

The TAT has initiated a program of water measurement at the watercourse and minor level.

Remodeled outlets have been calibrated. Data pertaining to the flow before project interventions were introduced have been collected on a limited basis by the SMO staff. Although perhaps a good start, these activities have not yet contributed a great deal toward the development of a water management plan. Data concerning existing crops and their water requirements have also been collected on a limited basis. These data are essential to the development of the water plan.

A program to monitor and evaluate the relative success of the various alternate pilot water-management plans implemented should be introduced, in order to determine which plans should be replicated over a wider area. The data required would include water availability, crop yields, and area cultivated after a plan had been put into effect. WMU personnel should work closely with the M&E units within their respective SMOs because the WMU members require crop and other data obtained by the M&E unit to develop the water plan. The evaluations prepared by the M&E unit can help determine the direction of WMU activities.

5.5.3 Technical Training

Training workshops are needed to upgrade the skills necessary to develop water management plans. Workshops should consist of presentations prepared and given by the TA water management specialists. Members of the WMUs and the M&E units should attend. Possible topics could be water scheduling, water rotation, precision land leveling, use of rows and furrows for planting, canal return flows, determination of crop-water requirements, determination of water availability, preparation of alternative water management plans, and evaluation of water management results.

To provide technical training, there must be counterparts in the SMO offices to receive it. There are trained members in the Punjab SMO and some in Sind, but counterpart personnel in the other offices are few. This situation should be rectified, both because the project documentation requires it and because it will be essential to realizing the project's water management objective. In addition to workshops, a fundamental way that technical knowledge is transferred is through on-the-job training. To effect this transfer, the TAT should work more closely on a day-to-day basis with the SMO staffs.

5.5.4 Water Management Plans

No irrigation system operational plan for any one subproject has been developed or implemented, although parts of the methodology have been developed and studied. On some demonstration plots, a few techniques have been introduced, but they were mixed up with agricultural innovations and the results were inconclusive.

Water management plans should be introduced on one watercourse in each subproject area. In each alternative plan, two or three water management techniques discussed above should be introduced. The results should be monitored, and the most successful plan tried in other subproject areas. Given CWM's experimental bias, three or four alternative plans should be developed. The techniques introduced need not be complicated, highly technical, or experimental. Simple water management techniques, such as water scheduling, timing, late irrigation, and receiving the proper amount of water for the crop being grown would be sufficient. Concurrence of all concerned parties must be obtained. The plans must be drawn up quickly before the onset of the next crop season.

Most important of all, the farmers must be educated about the value of the techniques required to improve water management. In order to accomplish this, the TAT water management specialists should provide guidance and assistance to the WMUs in the SMOs. These units should be assisted by the WUADs. The WMUs should prepare the water management plans, with collaborative assistance from the TAT specialists. The WUADs and Agricultural Extension staff, assisted by the TAT, should identify farmers receptive to trying to implement pilot plans.

The plans should be simple so that the farmer has a chance of carrying them out. Each plan should propose only one or two techniques, such as adjusting cropping patterns, changing water schedules, rotating available water supplies, chang-

ing the planting time, and distributing water at the watercourse level according to crop need instead of acreage. The M&E units should evaluate the effort, starting with collection of simple baseline data, possibly acquired through rapid appraisal techniques.

Time is of the essence because the next crop season is quickly approaching, and unless there is a project extension this will be the last chance for the TAT to be involved in carrying out such a trial of various techniques to improve water management. Even if there is an extension, it is essential to begin moving in these proposed directions as quickly as possible. The plan should be prepared in such a way that any financial losses that occur do not fall on the farmer who tries to implement the proposed plan. Improved water management techniques must first be attempted and proven at the watercourse level before more-grandiose plans are developed for entire commands or groups of commands.

5.5.5 Feasibility of Improved Water Management

The Indus River Valley irrigation system has been designed as a supply-driven system and cannot be converted to demand-driven systems in the foreseeable future. Improvements feasible at this time can only occur at the watercourse level until extensive modifications are made to the entire irrigation distribution system.

Techniques to improve water management should first be introduced at the watercourse level below the mogha outlet. The amount of water that will be available at this level of the system is fixed and must be taken as a given. The improved management techniques will have to be introduced within the context of this given supply situation. Later, when a plan proves successful, it can be tried in other subprojects and eventually replicated over a wider area.

6

PRODUCTIVITY, EQUITY, AND INCENTIVES FOR FARMER ORGANIZATION

6.1 The CWM Concept

CWM has made a beginning with its catalytic intervention, which identified watercourse renovation as the entree for farmer participation. The merit of this intervention is that it invests in income-generating common property owned and managed by farmers. Its potential lies in three directions:

- generating economic benefits from increased water availability for all or most of the farmers located along a watercourse;
- organizing beneficiary farmers into a broad-based participatory process, one that extends beyond a few influential farmers; and
- building programs for water and nonwater inputs upon the enthusiasm generated by watercourse renovation.

Although there are no quantitative impact data, farmers and line agencies believe that CWM has successfully improved water availability, which has already resulted in higher production for large numbers of farmers. But CWM has had only limited success in generating broad-based farmer participation. The project has not contributed to improved systems for maximizing water-delivery returns or demonstrated how it can build upon farmer enthusiasm to promote sustained productivity increases through water and nonwater inputs.

6.2 Expected Benefits

With a budget of \$82 million, CWM has a five-year cost of \$161 per CCA and \$114 per beneficiary. The annual cost per beneficiary is \$23. Many of those interviewed in the course of this evaluation felt that CWM is an expensive project. The justification for such an investment can be sought in the payoff expected from it. The World Bank's SAR estimated a 24 percent overall rate of return to investment.

The Bank also estimated that the project would increase per-capita farm incomes by 18-33 percent, except in Lasbela, where an increase of 242 percent was expected.

The SAR estimated that the project area's crop water requirements at watercourse head were 1.97 MAF, as against total water availability (from canals and tubewells) of 1.41 MAF. The lining of minors and distributaries was expected to save 50,000 AF, and renovation of watercourses another 237,000 AF. The SAR assumed that 70 percent of the water saved (i.e., 201,000 AF) would be used to expand planted acreage, and 30 percent (i.e., 86,000 AF) for yield-increasing practices.

The SAR also estimated that, as a result of increased water availability and the noncivil-works inputs, with-project cropping intensities would be 22 percent higher than without-project, and yields per acre would be 35-50 percent higher for wheat, 30-40 percent for cotton, 30-35 percent for maize, 30-50 percent for fodder, and 25-35 percent for sugarcane. The SAR does not explicitly separate the assumptions for expected contributions by water and nonwater inputs to increases in yields. These can, however, be "reconstructed" with the following assumptions:

- The additional 86,000 AF water that is assumed to be available for yield increases represents 6 percent of the preproject water supplies of 1.41 MAF.
- A high estimate of the impact of additional water on crop yields would be that 6 percent more water results in 6 percent increases in yields.
- Nonwater inputs would be expected to contribute yield increases of at least 29 percent for wheat, 24 percent for cotton, maize, and fodder, and 19 percent for sugarcane.

- These estimates imply annual compound growth rates of at least 4.5 percent in wheat yields, and somewhat less for the other crops.

The numbers given above may or may not be thought of as targets, but they do highlight the importance of nonwater inputs in making the project economically viable. Without effective programs for nonwater inputs, CWM's economic payoff may be significantly reduced. Put differently, without new models for the delivery and use of nonwater inputs, farm production increases will be restricted to those that have already been delivered by the civil works. Farmers would have little incentive to participate in project objectives and activities beyond civil works.

6.3 Civil Works

USAID funds the renovation of watercourses. At present, there is one general model of watercourse renovation and maintenance. It is linked to farmer participation in the following significant ways:

- OFWM is expected to consult with farmers in the survey and design for renovation, even though lining can be carried out only on a fixed percentage of the watercourse, generally only at their heads.
- The WUA is required to provide unskilled labor for earth work; in Punjab, it must also pay for stone masons.
- The WUA is expected to maintain the renovated watercourse; and, (4) landowners are required to pay a proportion of the materials cost in installments, along with their normal water charges.

6.3.1 Planning and Construction

While anecdotal evidence was presented during field visits on how farmers have helped OFWM with the alignment and design of watercourses, there is no documentation of the process through which farmers and OFWM come together to work out the technical details. This lack of systematic information leaves many questions unanswered, including how OFWM interacts with farmers at the survey and design stages, whose priorities are reflected in the alignment and other physical improvements, and the extent and location of the lining.

Some evidence suggests that OFWM and other departments rely heavily on the guidance and advice of the WUA executive committee. This practice excludes the general membership of the WUA from participating in the design of watercourses to be renovated. If farmer participation is a desirable objective, then the survey and design process for watercourse renovation must have the flexibility to involve a broad cross-section of the water users. CWM needs a model of planning and construction that does the following:

- involves all the water users (not just the executive committee of the WUA) in designing watercourse renovation;
- provides the flexibility needed for location-specific planning; and,
- allows the project to change its approach to watercourse renovation in the light of farmer feedback and ongoing monitoring.

6.3.2 Cost-Recovery for Watercourse Renovation

CWM does not have any systematic data on how farmers have mobilized the labor costs required for watercourse renovation, and what impact this has had on farmer participation. Indications are that labor contributions have been most easily forthcoming where water users belong to a homogeneous and cohesive social group. In areas where landlords dominate tenants, the tenants may have provided the labor by custom without visible remuneration. In areas with heterogeneous socioeconomic groups along the same watercourse, affluent farmers and desperate tail-enders appear to have contributed more readily than others. The process of recovering a portion of the materials cost has not yet reached the collection stage.

Within this context, the project must analyze the distribution of labor costs provided by farmers and assess its impact on promoting or preventing cohesive farmer groups. In view of the apparently nonuniform social impact of the requirement to pay costs in labor, the project should consider experimenting with alternative cost-recovery mechanisms that are consistent with CWM's participatory objectives. One alternative might be a combination of the following:

- require the WUA to save a specified amount in a collective bank account as a precondition for renovation;
- pay the full estimated cost to the WUA at the time of construction, but after construction, require repayments in installments from the WUA, not from individual landowners;
- suggest that the WUA use its collective savings to pay for maintenance and installments; and,
- if possible, try to develop a model of group credit that uses a portion of the WUA's savings as collateral for group loans.

The major potential of this approach lies in using cost-recovery and financial management as an incentive for continuing cooperation among water users. The major challenge it poses is that cost-recovery would depend on the WUA's ability to manage common problems and collectively owned capital. Put differently, effective farmer organization would become a significant determinant of the financial health of the government agency that invests in watercourse renovation.

6.3.3 Watercourse Maintenance

No explicit CWM model for watercourse maintenance exists, only a desire to see WUAs maintain watercourses after renovation. There are functioning traditional models of maintenance in most of the SPAs. These models usually have well-defined mechanisms through which water users mobilize the labor needed for maintenance at various times of the year. But they do not yet have well-defined ways to maintain the lining that has been provided as part of watercourse renovation. Maintaining lined watercourses probably requires new skills and new ways of mobilizing resources. It is possible that farmers themselves may find it easy to devise appropriate changes in their traditional maintenance models, but this development has yet to be observed.

The project should document how farmers are adapting their traditional rules for mobilizing maintenance resources. If farmers cannot maintain the lined watercourses satisfactorily, the project should devise a new maintenance model that grafts new skills and management methods on traditional models. If both the farmers and the project fail to

devise appropriate maintenance models, the large investment in renovation may have to be repeated some years later.

6.3.4 Watercourse Lining as Catalyst for Social Organization

Of all the costs incurred by the project, only the cost of materials in watercourse renovation is a subsidy for the development of farmer-owned common property. While other project components entail subsidies to individual farmers or government agencies, the investment in watercourse renovation is a subsidy to collective action by farmers: the project's only tangible investment in community organization. Experience elsewhere in Pakistan has shown that appropriately designed investment in communal-irrigation infrastructure can be a catalyst for community organization, i.e., irrigation infrastructure can be an effective social organizer. A watercourse is common property; watercourse improvement can potentially benefit all those located along the watercourse.

While watercourse renovation has energized large numbers of farmers, it has not brought them together in sustainable groups and has not been followed by additional opportunities for cooperative endeavor. Indeed, a significant opportunity for WUA follow-on activities may have been missed by the project. The completion of civil works resulted in increased water availability, increased cropped area, and increases in the demand for various inputs. The increased demand for inputs has been met from established channels/means. Project-sponsored institutions have not proved useful, since the project does not have operational models to provide inputs and credit on a scale large enough to meet the increased demand.

Lacking additional functions to perform, the WUA becomes dormant or dead once construction is completed. Some project staff make a case for additional lining, as a way of keeping the WUAs alive and active. Additional lining, however, is a one-time activity that cannot keep the WUAs alive on a continuing basis: it cannot be a substitute for more effective income-generating programs in noncivil-works categories that can sustain the interest of WUAs on a continuing basis. In fact, continuing attention to civil works costs the project some critical lead time in developing interventions in other areas, such as water-user organization, technology transfer, input supply, credit, and marketing.

6.4 Improving Agricultural Technology

6.4.1 Agricultural Extension

The CWM design did not propose a package of technology that needed to be extended to project-area farmers. In this sense, the design was flexible, calling simply for 1,050 acres of demonstration plots. For the purposes of technology transfer, the CWM design identified the Extension Directorates of the Provincial Agriculture Departments as the mechanism. Thus, the design prescribes the medium of extension (demo plots) and the mechanism for technology transfer (extension agents) but does not prescribe the technology.

It is important to bear in mind that agricultural production is a matter for individual farmers; it is not a group activity. New agricultural technology can be expected to bring about increases in farm production, but cannot by itself lead to collective effort by farmers. If, however, the diffusion of new technology requires collective management of input supplies and farmer training, then agricultural development activities can become an important vehicle for promoting farmer organization.

6.4.2 Determining What Needs to be Extended

Predetermining Technology Packages

Collaborating CWM agencies have the flexibility, at least in project design, to choose the technology they want to extend. In practice, the choice of technology is dominated by the predetermined packages of the Provincial Agriculture Departments. This means that location-specific factors and the economic interests of small farmers and women may be unreflected in the technology that is being demonstrated. Although some of the project staff said that the responsibility for this apparent rigidity lies with the Agriculture Departments, the evaluation team observed that: (1) the Sind TA team agronomist had recommended technology that was more location-specific than the Agriculture

Department's recommendations, and the department had devoted considerable manpower to establishing demonstration plots as recommended by the TA team; (2) the TA team has included a forestry component in its work plan, apparently in response to local needs; and (3) the Punjab SMO and OFWM staff have been discussing how to organize machinery rental for farmers. At least in these instances, the Provincial Agriculture Departments have not been a constraint on either the TA team or the SMO recommending appropriate technology for farmers.

Identifying location-specific technology is a matter for diagnostic analysis and research. Perhaps one reason for CWM's failure to recommend location-specific technology may be its failure to link up with agricultural and social science research units in the country or to conduct effective diagnostic analyses on its own. Although the PPA lists several of the A.I.D.-sponsored research efforts that could provide useful input to CWM in technology choice, other worthwhile efforts are unmentioned. The funds for local consultancies are also reportedly available with the TA team and the SMOs. The evaluation team saw no evidence to confirm that any of these opportunities have been adequately pursued.

An Approach to Location-Specific Technology

Given the main crops of the project area¹, each SPA's farming systems could be analyzed quickly and comprehensively with the aid of literature review and a rapid appraisal exercise conducted jointly by agricultural and social scientists. Numerous agro-economics reports have been published by the joint PARC-CIMMYT research program that include pioneering work on the identification of farmer priorities in cotton-wheat, rice-wheat and maize-wheat areas, as well as analyses of other crops and technologies. A rapid appraisal exercise (perhaps in collaboration with trained staff from the PARC-Agricultural Economics Research Units) could be directed at broad sets of farming activity, such as cereals, vegetable, and livestock and fodder. One function of this exercise would be to identify

¹ i.e., cotton-wheat in Pakpattan, 6-R, and Sind (with fruit and vegetables); rice-wheat in Niazbeg (with fodder) and much of Shahkot; and maize-wheat in Warsak and part of Shahkot. Lasbela and Sind, and to a lesser extent Warsak have access to marketing outlets for fruits and vegetables, which their cropping patterns reflect.

specific opportunities for small farmers and women, who have not yet received specific attention from the project.

Although considerable experience and intuitive reasoning behind the work has gone into technology recommendations, there is a need to systematically identify technology that can be extended in the near future to large farmer groups in each SPA. This can be done by drawing up technology recommendations to correspond to a small number of recommendation domains, i.e., homogeneous groups of farmers for whom a few key recommendations can be made generally. The following steps may be useful: (1) identify the most important crops for the region; (2) identify a very small number of opportunities for each crop, with particular attention to the needs of small farmers and women; (3) for each crop and farmer group, prepare a "menu" of technology choices to be offered to farmers.

Project staff may also need to participate in adaptive research efforts in some fields, such as irrigation-agronomy interactions, for which ready recommendations are not available. Part of the demonstration-plots program could be converted to a program for adaptive trials, with the clear understanding (conveyed to farmers) that these plots are not for recommendation purposes.

6.4.3 Demonstration Plots and Farmer Days

CWM's extension model consists of demonstration plots established by the Extension staff, and farmer days organized by the SMO for farmers to observe and discuss the results of demonstration plots. Farmers on whose land the demonstration is established provide the land free of rental charges; the project provides the inputs and technical supervision.

While the demonstrations themselves are usually on the land of a large farmer, farmer days are expected to give all farmers a chance to acquire information on improved technology. The project has not reported any impact assessments of farmer days to document how many farmers attended these events and whether such attendance influenced their farming methods. The TA team maintains that farmer days serve to promote the project's participatory objectives; there is no evidence yet to support this claim, since neither farmer attendance nor impact has been quantified.

Plots are organized to demonstrate a complete package of improved technology, consisting of improved agronomic and water management practices (the Warsak model is somewhat different); the package is generally a predetermined package of 10-20 recommendations. Thus, there is lack of clarity in the message being conveyed to the farmer: farmers who have only sporadic contact with extension agents cannot unscramble complex technology demonstrations. Nor is it realistic to expect resource-poor farmers to adopt packages of new technology. Empirical evidence from Pakistan and elsewhere suggests that farmers adopt innovations one at a time, in a sequence, rather than as a package; this has to do with the learning curve and other costs of innovation adoption. The project's approach increases the learning costs for the farmer and ignores the implications of complex technological packages for the farmer's cash and labor costs.

As is often the case with demonstration plots, the new technology has been demonstrated on land provided by large farmers, who can bear the risk of experimentation. Unless efforts are made to effectively communicate positive findings to small farmers, the demonstration program may lead to increased disparity. The demonstration-plots program needs an innovative communications approach in order to reach the small farmers. The expectation that farmer days provide such an approach for small farmers needs to be examined with quantitative follow-up data on patterns of technology adoption.

Complex technological packages and lack of impact data lead to the presumption that perhaps no significant technology transfer has taken place through the project's efforts. There is, as yet, little or no improvement in the way extension programs can aid the transfer of technology to farmers. CWM's model of demonstration plots and farmer days is not a demonstrable improvement over existing extension models. Nor is there any evidence of farm production increases. It is possible that CWM activities have benefited a few influential farmers, but evidence on wider diffusion of new technology is missing.

Some of the SMOs and their TA team counterparts have made a promising beginning by undertaking to identify which crops to work with, restrict their fertilizer recommendations to levels within the reach of the farmer, involve extension staff in the

demonstration plot program, and organize a large number of plots all over the SPA.

Extension efforts will have a higher pay-off if the following actions are taken:

- Demonstration plots demonstrate only those one or two technologies that have a good chance of being adopted by farmers in the next season.
- Solid documentation is maintained for demonstration and control plots, for both monitoring and eventual extension purposes.
- Any positive results are communicated by means of farmer days, audio-visual techniques, radio and extension leaflets to the largest possible number of farmers.
- Supplies and services are organized around those technologies that have already captured the attention of most of the farmers.

In addition, if new technology entails the demonstration of specific inputs (such as new varieties), the project should consider distributing the input as widely as possible for demonstration purposes. There is no inherent merit in concentrating technology demonstrations on project-supervised plots of one or two acres each. If there is a simple and attractive technology that can be managed by the farmers themselves, the project should cause it to be demonstrated widely.

6.4.4 Farmer Training for Agricultural Extension

The project has no formal training program for farmers, although there are opportunities for both men and women to be trained in a number of traditional and new activities. During its field visits, the evaluation mission heard reports that many farmers suffer serious crop losses due to disease and pests. Some of the SMOs may find it possible to experiment with farmer training in a small number of fields, such as livestock disease control, seed treatment, and plant protection. There is potential for involving women in programs for vegetable gardens, improved fodder, community or individual woodlots, fruit picking and processing, etc. Training women in these and other activities could be an important way of improving farm production and farmer participation.

In general, a model of farmer training is needed in which government or other agencies provide the

instructors and training facilities, and farmer groups nominate farmers for training and support trained farmers by remunerating them for their time and supplies. If farmers undertook to pay for the services of a village specialist, the training would have to have demonstrable value in added agricultural production. For some activities, farmers may become the paid extension agents for farmer groups. If this happens, then CWM would have brought about an important change in the country's present extension model, which relies on over-stretched government extension agents.

The project should draw up a list of priorities for farmer extension training in each SPA. On the basis of information provided to the evaluation team, the project is advised to consider starting farmer training in seed treatment and plant protection. Training should be provided in collaboration with government departments. WUAs should be asked to accept the responsibility for nominating the trainees and remunerating them for services provided by them to the members.

6.5 Credit, Input Supply, and Marketing

6.5.1 Credit

The project's efforts so far have resulted in greater access to credit for only a handful of large and influential farmers. Two WUAs in Punjab have been organized as cooperatives so far, one of which has obtained a loan. There are six cooperatives in NWFP, two of which have obtained loans. Other SPAs report no examples of group lending. All SMOs have attempted to assist individual farmers with bank procedures, and some farmers have benefitted from the SMOs intervention. However, the existing financial system and project design placed serious limitations on what the project might have achieved.

The dilemma for the SMO, the TA team, and USAID project staff is that although greater farmer access to credit is one of the important elements of project design, it is one for which the national policy environment was not recognized as a constraint at the design stage. Banks follow policies and procedures determined at a national level either by their head offices or by the State Bank and the Pakistan Banking Council. A small project cannot be expected to change these policies. For instance, banks will lend only to credit-worthy individuals, not to groups of farmers. Similarly, zonal and local targets for agricultural loans are determined annually by the banks' head offices. Even if they get to learn

the detailed procedures to be followed for loan applications, very few farmers will be able to get better access to a more-or-less fixed pool of subsidized credit. At best, the project can assist a handful of credit-worthy individuals (usually large farmers) by playing an advocacy role with local branches of banks. Project staff have spent considerable time and effort discovering constraints that should have been obvious at the time of project design.

Other attempts include transforming WUAs into agricultural cooperatives. This approach requires careful attention to farmer organization, skills development, and capital formation, and also requires institutional linkages with the Cooperatives Department. The Cooperatives Departments, lacking a formal role and share in CWM, have not been integrated into project implementation: they appear sporadically in various SPAs, on the fringes of project activities.

A possible mechanism to overcome this difficulty would be for USAID and the Federal Cell to negotiate with one or more banks to make group credit available to project-area farmers with a realistic offer of the funds, procedures, and collateral required. A banking institution might be persuaded to provide a special WUA window. One way of making group credit secure is to insist that WUAs have a group savings program that will serve as loan collateral and to present this collateral as deposits in the lending bank.

If CWM decides to pursue the WUA-cooperatives transformation, then it should develop participatory WUAs in which the general body is supreme, make WUAs financially and legally responsible for their loans, impart the necessary skills in accounting, etc., and integrate the Cooperatives Departments into the project.

CWM might also consider putting money aside for a WUA revolving fund and developing its own model of a savings-and-loan system, based on developing the financial and managerial capacity of the WUAs: This would be similar to the credit-and-savings model of the Aga Khan Rural Support Program in Gilgit and should be examined first-hand by the TA team and GOP staff.

6.5.2 Input Supplies

As designed, CWM relies on the SCC and SMO to bring about changes in supplies by consulting with

representatives of state- and private-sector agencies. In operation, CWM has no specific models, and has made no visible improvements in the input-delivery system. There are no data on how the project might have contributed to increased provision of inputs and increased farm production. The failure to intervene effectively in input supplies must be counted as a missed opportunity for the project. The completion of civil works is reported to have generated a substantial increase in demand for inputs as farmers started increasing their cropped area. This increase was achieved through already-established channels, not through any of the institutions devised by the project. Other than the advocacy role played by the SMO, there are no data on how the project has made any difference to farmers by helping them increase their access to inputs.

The SMOs and the TA team need to identify a small number of critical inputs whose supply can be organized or influenced significantly by the SMO, and they need to determine appropriate delivery systems for such inputs. Possibilities include government agencies, private input-supply companies, input dealers within the project area, WUAs, individual farmers, existing farmer cooperatives, etc. The project also needs to identify a small number of opportunities that may make a difference to farmers. These may include:

- helping participatory WUAs obtain fertilizer dealerships;
- organizing seed farmers to provide good quality, although not necessarily certified, seed throughout the SPA;
- organizing certified seed from public- and private-sector agencies; and,
- organizing farmer training in plant protection with the collaboration of the agriculture department.

Extreme caution must be exercised with respect to such activities as arranging dealerships, specifically to ensure that the dealer-WUAs do not turn into the personal businesses of their chairmen: that would be inconsistent with the project's participatory objectives and would merely channel project resources to a few influential individuals. WUAs should be selected for project support from among those that have a sizable and relatively homogeneous membership, and they should first explain how their members plan to share the costs and benefits of the enterprise. Considerable careful project work would be required.

6.5.3 Marketing

No design for marketing activities exists. The TA team, however, has proposed some ideas for cooperative marketing. Since these have not yet been implemented, an assessment at this stage is premature. However, it would be difficult for the SMOs and WUAs to develop a cooperative system that improves upon private enterprise, with its entrepreneurial skills, access to capital and information, and established means of transportation, storage, and wholesaling. Nonetheless, a few of the possibilities noted in the TA team's documents need to be developed into operational models for field-testing. The project needs to carefully evaluate the potential for WUA involvement in marketing; other well-established entities could be performing several of the marketing functions already, and this may reduce the effectiveness and profitability of WUA enterprises.

6.6 Observable Indicators of Institutional Change

Institutional development is about learning and behavioral change, which are observable but not easily quantifiable. In the initial stages of institutional development, one can observe learning as it is reflected in new models for irrigated agriculture management. A management model is a guideline for combining physical, financial, and human resources. Over time, models of management may become institutions: they may be widely accepted as sets of rules and conventions for resources management. The CWM's watercourse renovation program is a management model but not yet an institution; the traditional system of watercourse maintenance, however, is an institution. Thus, new management models are short-term indicators of progress, and new institutions are long-term indicators. CWM's basic mandate, which is not yet being fulfilled, is to strive for the achievement of both.

CONCLUSIONS AND RECOMMENDATIONS

This evaluation of the Command Water Management Project has assessed project progress to date, particularly in the area of institutional development, and made recommendations for implementing modifications during the remainder of the project. The evaluation was also intended to inform the GOP, USAID, World Bank, and other donors about the value of similar CWM-type interventions elsewhere in Pakistan's irrigation sector. CWM is a complex and multifaceted undertaking. This final chapter will summarize and integrate the many findings and recommendations that have emerged.

7.1 CWM as a Two-Stage Institutional Development Process

Bringing about increases in agricultural production within the CWM context is a two-stage process. Each stage has its unique institutional development challenges, both for government agencies and for farmer participation.

As the project was designed, CWM's first-stage activities are catalysts for institutional development. This investment is required to energize line agencies and farmers to work toward the long-term objectives of effectively managing irrigated agriculture. While pursuing quantifiable civil works targets through familiar approaches, CWM was designed to engage government and farmer capacities to develop new approaches to water and nonwater management. The challenge in the first stage is to undertake civil works, establish coordinating mechanisms for line departments, and organize farmers into water user associations (WUAs).

The CWM's second stage requires movement in directions unfamiliar to government agencies and farmers. There are few quantitative targets and no blueprints. In its place, a process of experimentation has to be consolidated: new approaches to noncivil-works interventions must be identified, operationalized, tested, refined, and replicated. The challenge in the second stage is to identify and operationalize noncivil-works incentives for institutional development, promote broader public-

and private-sector involvement in the project, and nurture and support farmer involvement through WUAs, on a continuing basis.

7.2 Overall Project Impact and General Recommendations

7.2.1 Major Conclusions

CWM has generated considerable enthusiasm among line departments and farmers with its Stage One investment in civil works. Although there are no quantitative impact data, government officials and farmers report that the civil works have improved water availability and generally increased agricultural production, and a potential exists to increase agricultural productivity and raise farmer incomes. But CWM has had only limited and localized success in generating broad-based farmer participation or in improving the appropriateness or availability of nonwater inputs to farmers in project areas. And it has not yet demonstrated how it can build upon initial enthusiasm to promote sustained increases in agricultural productivity through water and nonwater inputs.

The following characterize CWM implementation:

- the extent to which the dominance of Stage One priorities has diverted the project from focusing adequately on Stage Two challenges and needs;
- the inadequacy of meaningful dialogue, thoughtful investigation, appropriate monitoring and evaluation, and implementation-specific planning concerning CWM's Stage Two objectives; and
- the extent to which, notwithstanding these problems, CWM has contributed to a heightened awareness among some key GOP authorities of the need to move from Stage One to Stage Two emphases. The challenge now is

to convert that awareness into commitment, programs, and action.

CWM's shortcomings have come about largely because of design deficiencies, especially concerning its institutional development elements, organizational and financial constraints on effective project management and meaningful farmer participation, continued inadequate understanding in some quarters regarding the project's long-term development objectives, and comparatively high level of project resources devoted to civil works.

Project capabilities to develop meaningful Stage Two activities are constrained by--

- unfamiliar concepts and lack of either experience in the planning and experimentation required for optimal Stage Two activities, or commitment to them;
- inability of line agencies, project implementation units, and the technical assistance team to develop mutual understandings regarding common objectives and how to work toward achieving them;
- failure to draw upon the experience of similar projects and the national resource bases of relevant knowledge; and
- inadequate staff and financial resources.

Similarly, strengthening WUAs for sustainable postcivil-works activities and greater farmer participation in irrigated agriculture production and productivity is constrained by--

- low levels of organizational, technical, and managerial skills;
- lack of inducements to further cooperative endeavor after completion of watercourse renovation; for example, the absence of improved access to needed agricultural inputs, credit, etc.; and
- the preeminence of vested interests in rural development initiatives, both within the WUAs and in relation to government and other agencies, which restrict access to participatory opportunities and the benefits of development efforts.

Given the challenges posed by these constraints, the high level of attention and staff time committed to civil works has cost the project some critical lead time in identifying and developing less-spectacular interventions to address CWM's stated long-term development goals. The limited efforts in farmer organization, water management techniques, technology transfer, input supply, credit, and marketing have yet to produce models for improved management of irrigated agriculture.

As a result, both farmers and project staff view civil works as the primary *raison d'être* of the project. This is an unsustainable approach, since subsidized civil works cannot be a continuing activity. A catalytic intervention, such as CWM was intended to be, cannot function indefinitely as a heavily subsidized program.

7.2.2 General Recommendations to Address CWM's Broad Challenges

Impact Assessment of Civil Works

CWM must produce reliable quantitative data on the effectiveness of its civil works activities in improving water availability, and the impact of increased water supplies on agricultural production and productivity.

Future Funding for Civil Works

During the remainder of CWM, such impact data should be a precondition for granting civil works funds in excess of the physical targets set in project documents. This data should also precede any further civil works investment in any CWM follow-up project that might occur.

Reaffirmation of CWM Goals and Objectives

Key personnel from USAID, the World Bank, the FCC, the PPCs, the SMOs, and the TAT should together reexamine CWM progress toward accomplishing its stated objectives, should reaffirm their commitment to pursuing those goals, and should provide all concerned persons with clear guidance regarding efforts required to accomplish this. Preferably, such an undertaking would be implemented through a well-publicized national meeting. Follow-up should be monitored by the FCC, in close collaboration with the donors.

Greater Cooperation and Involvement of Middle Management

CWM concepts are endorsed and supported at the highest levels of government, and CWM activities have generated much enthusiasm and support among the farmers. However, a large segment of broadly defined middle management within the government structure has not yet committed itself to pursuing the CWM course. Sustainable implementation of CWM concepts will require changes in traditional roles, relationships, and perspectives at these levels, some of which will be resisted. One of several necessary elements is an acceptance that the continuing pursuit of the CWM approach benefits the overwhelming majority more than any known alternatives.

CWM planning and implementation needs to foster an awareness that positive involvement by mid-echelon GOP bureaucracy is necessary and appropriate. Project activities should be designed in ways that can contribute to an understanding of how this might be attained most effectively.

Integrating Line Agencies, Project Implementation Units, and the Technical Assistance Team

Line agencies, project implementation units, and the TAT should strive to develop a common understanding of their respective roles in conceptualizing and undertaking the kind of experimentation that CWM needs. This common understanding should be reflected in a single integrated workplan for the entire project, under FCC auspices, and in integrated subproject-specific work plans, under SMO auspices in each province.

Enhancing the Technical Assistance Contribution

Technical assistance is extremely important to a project such as CWM, which should be exploring new ways to address old problems. It would be highly desirable to have a technical-assistance involvement throughout the life of the project. While the TAT has attempted a variety of efforts to contribute to project implementation, these efforts have lacked adequate focus and coherence. The GOP's role in providing guidance, support, and responsiveness to TAT efforts has been undirected and sporadic. Thus, the TAT has been unable to provide technical assistance and implementation support commensurate with the needs of the project.

USAID and the FCC should jointly convene a meeting to discuss ways and means to both maximize the TAT's contributions to achieving CWM objectives and determine the mechanisms for their delivery.

Additional Resources for NonCivil-Works Activities

CWM should designate additional funds and government should commit staff time and support costs for noncivil-works activities such as agricultural extension, water management, and adaptive research. The project should seek out ways to promote group savings and loans through WUAs. Parties most directly concerned should jointly propose priority setting to allocate resources for this effort. The project should also seek private-sector partners for WUA activities, particularly in input supplies and marketing.

Monitoring and Evaluation

In addition to the civil works impact data noted above, CWM should accelerate its efforts to put into place a functioning capability to collect and analyze data concerning project progress in noncivil-works areas. This effort must focus on assessing project impact: its end products must be materials that enhance learning from project experiences and experiments in ways that facilitate planning and optimizing results.

The evaluation effort should include an ongoing system that monitors farmer participation in each project activity, in order to document both the process and the extent of the beneficiary involvement and benefits. There should be a conscious attempt to assess constraints upon participation by small farmers, tenants, and women. Mechanisms should also be incorporated for FCC, TAT, and donors to monitor the evolution of different institutional development models that are emerging through project implementation, such as the different organizational and management models for the SMOs.

Learning from Others' Experience

Project staff should maintain a systematic program of visits to relevant activities in Pakistan, and elsewhere, on a highly selective basis. These visits should include other CWM project sites, so that

CWM staff can learn from the experience of their professional colleagues. Individuals with practical experience in farmer organization and interagency coordination of development projects should be hired as short-term consultants. The project also should encourage its professional staff to develop links in Pakistan with agricultural research and social science organizations.

Broad-Based Farmer Participation

CWM should make every effort to broaden the base of farmer participation in activities that enhance agricultural productivity. This should include involving farmers through WUAs both in the decision process and activity monitoring for civil works construction and in the identification, testing, and implementation of noncivil-works activities. Farmer involvement could be facilitated by making management committees accountable to frequent general body meetings, and by making more association activities accountable to the public.

7.3 Improve CWM Implementation

7.3.1 Government of Pakistan Responsibilities and Activities

Participation in SCC Activities

Conclusion: Bringing line agency personnel and farmers together in SCC meetings is beginning to contribute to greater governmental appreciation of farmer concerns and requirements. This procedure shows considerable promise of improving system performance, especially in providing agricultural inputs.

Recommendation: Encourage and support SCC activities. Work toward making the SCCs a venue for effectively addressing priority needs of participants. Ensure that commitments made at SCC meetings are carried out.

OFWM and Farmer Participation in Survey, Design, and Construction

Conclusion: Systematic data are lacking on how farmers participate in the survey and design of watercourses. There is evidence, however, that OFWM relies on the advice and priorities of WUA executive boards and committees, sometimes to the detriment of the interests of less-influential water

users. There is also evidence that the majority of WUA members in many areas do not understand project requirements and are not privy to management and financial decisions during construction.

Recommendation: The project should collect descriptive data on how farmers participate in the survey and design process. Regular general body meetings should be held to explain project objectives and requirements, and to discuss receipts, expenditures, and other construction matters. Discussions and transactions between WUAs and OFWM should be held in general body meetings.

7.3.2 Donor Involvement and Coordination

Supervisory Consultants for IDA-funded Civil Works

Conclusion: CWM's use of supervisory consultants has led to improvements in construction quality. Indications are, however, that such consultant involvement is not leading to any long-term improvements in PID capacity to monitor quality, or plan and manage civil works.

Recommendation: The PIDs should play a more substantive role in planning and designing the canal improvements themselves, and these designs should be only checked by the consultants. Whether or not the use of supervisory consultants serves CWM's institutional development objectives merits examination.

USAID Management of Its CWM Components

Conclusion: There is a perception within GOP circles, which appears valid, that USAID/Pakistan could more flexibly and responsively administer its CWM components, within the limitations set by its own bureaucratic constraints. The most frequently cited areas of concern relate to interpretations of permissible percentage ceilings for watercourse lining, inflexibility with respect to local imperatives, and PIL processing.

Recommendation: USAID should relax its own project management requirements to whatever extent is possible and consistent with the need for adequate project oversight. USAID's principle objective should be to communicate to concerned parties its commitment to those CWM design elements that emphasize the need for flexibility and experimentation in project implementation.

Focus of CWM Dialogue between GOP and USAID

Conclusion: The dialogue between USAID and CWM personnel within the GOP is currently preoccupied with Stage One civil works issues in ways that significantly impede adequate attention to Stage Two concerns and priorities. This inattention detracts from the project's ability to properly deal with these latter issues and, therefore, is contrary to the project's best interests.

Recommendation: Outstanding civil works issues should be resolved as quickly as possible. Failing that, all parties should agree to periodically suspend discussion on these issues for specified periods of time, to enable them to focus on the project's noncivil-works goals and objectives.

7.3.3 Consultancy Services

Integration of the TAT into the Project

Conclusion: The TAT is poorly integrated into the project. Neither is its internal working coordinated nor has it generally developed adequately beneficial relationships with the SMOs or other concerned agencies. TAT direction and leadership relating to the identification and pursuit of CWM objectives has been inadequate.

Recommendation: The TAT needs to stop thinking of itself as responsible only to USAID and begin working more collaboratively with the CWM implementation units. This collaboration should be on a daily basis and occur at subproject sites as much as possible. The maintenance of totally separate TAT offices in the cosmopolitan urban environments of Karachi and Lahore does not serve the project's best interests and should cease. Joint reporting formats on SMD/TAT/Line Agency activities should be developed and made operational.

7.3.4 WUAs and Farmer Participation

Broadening Farmer Participation through WUAs

Conclusion: By and large, the WUAs are dominated by traditional leadership and the managing committees/boards. This stems from a bias toward committees and influential farmers during the implementation process of CWM and from existing legislation on WUAs.

Recommendation: The WUA managing boards and committees should be made accountable to their entire memberships. Project staff should discuss WUA matters in open general body meetings, not in board and committee meetings. WUA by-laws should require regular and frequent meetings of the general body during watercourse renovation and after completion of construction, as well. By-laws should require general body resolutions on matters of common interest, and project staff should respond to the consensus of the general body. Accounts should be rendered and approved in general body meetings.

Federations of WUAs

Conclusion: Attempts to create federations have so far been flawed and premature: there is no base of viable primary societies that could become effective federating units or could contribute the required leadership of farmer activists to the federations.

Recommendation: CWM should first develop participatory and viable WUAs as a base. Federations, if and when they emerge, should be made accountable to the WUAs.

Integration of WUADs into Existing Institutions

Conclusion: WUADs currently have no well-defined continuing role. Considering the continuing requirement for farmer organization, there is a need to integrate the roles and responsibilities of the WUADs into government institutions.

Recommendation: The roles and responsibilities of the WUADs should be institutionalized in either the Extension or OFWM departments. Decision criteria for this choice include the need to link farmer organization to watercourse renovation and the continuing need to provide extension advice and agricultural services to the WUAs.

Cost Recovery

Conclusion: CWM has no systematic data on how farmers have mobilized the labor costs required for watercourse renovation and what impact this has had on farmer participation. The provisional evidence suggests that the requirement to pay costs in labor has had a nonuniform social impact, and may have undermined broad-based farmer participation.

Recommendation: CWM must analyze the distribution of labor costs provided by farmers and

assess its impact on promoting or preventing cohesive farmer groups. The project should consider experimenting with alternative cost-recovery mechanisms that are consistent with CWM's participatory objectives. One alternative might be a combination of the following:

- Require the WUA to save a specified amount in a collective bank account as a precondition for renovation.
- Pay the full estimated cost to the WUA at the time of construction, but after construction require repayments in installments from the WUA, not from individual landowners.
- Suggest that the WUA use its collective savings to pay for maintenance and installments.
- If possible, attempt to develop a group-credit model that uses a portion of the WUA's savings as collateral for group loans.

The major challenge posed by this approach is that cost-recovery would depend on the WUA's ability to manage common problems and collectively owned capital. Put differently, effective farmer organization would become a significant determinant of the financial health of the government agency that invests in watercourse renovation.

7.4 Improvement of CWM's Production Programs

There are no blueprints for these programs. CWM should carefully identify farmer priorities, determine if there are relevant models in Pakistan or elsewhere, devise or adapt appropriate models, test them in the field, and monitor them carefully in order to refine or replicate them.

7.4.1 Improved Water Management Techniques

Computer Models for Farm-Level Improvement

Conclusion: The TAT's computer models are analytical tools for understanding farmer choices, but they cannot be equated with a set of operational recommendations for farmers. Models yield options for field testing, but not recommendations for demonstration or farmer adoption.

Recommendation: Since the project is charged with developing replicable techniques for improved water management, it should work with an appropriate measure of adaptive research. Computer models or informal rapid appraisal can be used to identify a small number of options that are most likely to increase production. In order to become operational, these options should be field-tested and monitored, then refined or discarded.

Precision Land Leveling

Conclusion: PLL is being conducted mostly on large farms with a government subsidy, and the subsidy is being captured essentially by large farmers. There is little recorded impact on farm production, incomes, and neighboring farms. The case for a subsidized program for PLL as an integral component of CWM appears weak and seems driven more by civil works imperatives than any objective assessment of costs and benefits. Although PLL remains (perhaps prohibitively) expensive, farmers in many areas are already paying attention to good, if less sophisticated, nonprecision leveling techniques.

Recommendation: CWM should move from a predetermined and costly technology toward one that appears to have a more realistic chance of being adopted by larger numbers of farmers in the near future, i.e., away from precision leveling and toward improved leveling. The project should understand why some farmers find it beneficial to level their fields more carefully than others, identify the larger set of farmers who might benefit similarly from improved leveling, and clearly demonstrate/communicate the benefits of improved leveling as a cost-effective technology.

7.4.2 Improved Agricultural Technology

Broad Directions of SMO-TAT Efforts

Conclusion: Some of the SMOs and their TAT counterparts have made a promising beginning by -

- identifying appropriate crops with which to work;
- restricting fertilizer recommendations to levels within the reach of the typical farmer;

- involving extension staff in the demonstration plots program; and
- organizing a large number of plots all over the SPA.

The program of demonstration plots shows the project's ability to coordinate line agency efforts. The plots, however, fail to convey simple and clear messages to farmers and scientists about technology choices.

Recommendation: To increase the potential payoff from agricultural extension initiatives, future efforts should be developed in the following directions:

- Demonstration plots should demonstrate only those one or two technologies that have a good chance of being adopted by the farmers in the next season.
- Quantitative follow-up data should be gathered on inputs and outputs (including straw and residues) on control and demonstration plots, for both monitoring and evaluation extension purposes.
- Any positive results should be communicated by means of farmer days, leaflets, audio-visual techniques, radio, etc.
- Supplies and services should be organized around those technologies that have already captured the attention of most of the farmers.
- In all of the above, the special circumstances and priorities of small farmers, tenants, and women should be incorporated into project approaches and work plans.

Provision of Extension

Conclusion: New technologies have been demonstrated mostly on land provided by large farmers, with a project subsidy. Farmer days are held for farmers to observe and discuss the results of the demonstrations. No quantitative data from any SPA were made available to the evaluation mission on how many farmers attended these demonstrations and whether any of them adopted new technologies after they were demonstrated. The demplots demonstrate large and complex packages of new technology. They offer no visual or statistical methodologies for farmers and specialists to understand the message within the framework of their ability to pay for them, to determine which

technologies have the greatest potential for agricultural incomes.

Recommendation: The expectation that farmer days provide adequate communication to WUA members should be examined with quantitative monitoring data; the impact of demplots and farmer days on the adoption of demonstrated technologies should also be examined. CWM should undertake to demonstrate one or two key technologies at times that would allow the technologies to be adopted in the next planting season. When interventions for women are identified, CWM should make suitable arrangements for extension services to them.

Farmer Training

Conclusion: The project has no formal training program for farmers, notwithstanding the facts that provision for training is made in the project documents and training opportunities exist in a number of traditional and new activities. The project has no female extension staff to manage a training initiative for women. In fact, it has no female staff at all. A well-planned training program can be a useful supplement to current extension efforts and can also promote collective management of common problems.

Recommendation: The project should draw up a list of priorities for farmer extension training in each SPA. On the basis of information provided to the evaluation team, the project should consider starting farmer training in seed treatment and plant protection. Training should be provided in collaboration with government departments but not necessarily always at existing government training facilities: training should, whenever possible, take place in the field, when it is more observably relevant to field circumstances and needs. WUAs should be asked to accept responsibility for nominating the trainees and remunerating them for services they provide to other members following completion of their training.

7.4.3 Input Supplies

Conclusion: Most farmers reported that they were able to increase their cropped area as a result of the civil works. If true, there would have been a large increase in demand for agricultural inputs following the completion of civil works. To the extent that such an increase took place, it was met through established channels/means, not through project-

sponsored initiatives. Other than the advocacy role played by the SMO, no data show how the project has made any difference to farmers by helping them increase their access to inputs.

Recommendation: CWM should identify a small number of opportunities in which it can actually make a difference to farmers, such as these:

- helping participatory WUAs obtain fertilizer dealerships;
- organizing seed farmers to provide good-quality, but not necessarily certified, seed throughout the SPA;
- organizing certified seed supply from public- and private-sector agencies; and
- organizing farmer training in plant protection or postharvest crop protection with the collaboration of the Agriculture Department.

7.4.4 Credit

Conclusion: CWM's approaches to credit represent inadequate and flawed attempts to improve systems performance. Credit efforts have helped a handful of farmers obtain subsidized credit and have provided information on bank procedures to a somewhat larger group of influential farmers. This has been accomplished only at a large cost in staff time and resources. Unrelated government initiatives relating to credit access by small farmers have negated these initiatives.

Recommendation: If CWM decides to pursue credit from the banks or Cooperative Departments, it should make prior project-wide arrangements at the highest levels of the national financial establishment in order to integrate these institutions into the project. If CWM decides otherwise, it may consider setting aside money for a revolving fund for WUAs and developing its own model of group savings and loans.

7.5 USAID/World Bank Interactions

Conclusion: There are important but inadequately understood differences between the ways in which USAID and World Bank/IDA project components are perceived and implemented. The World Bank/IDA's traditional emphasis on infrastructural development is well understood and appreciated. This approach has tended to dominate perspectives on CWM implementation to the extent that USAID's primary focus, institutional development, has been consigned to a secondary position.

Recommendation: USAID and the World Bank/IDA should discuss those implementation issues that stem from their respective design documents and operational procedures. From USAID's perspective, the purpose of such discussions should be to seek IDA's commitments for greater support for CWM's noncivil-works objectives. If such support proves difficult to obtain, USAID might find it advisable to design and implement CWM follow-up activities through a new project carried out independently of the World Bank/IDA. Such a step should, of course, be taken only if USAID's project objectives for CWM did not suffer as a consequence.

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PAKISTAN
Project No. 391-0467

**MID-TERM EVALUATION
OF THE
COMMAND WATER
MANAGEMENT PROJECT**

**VOLUME TWO
APPENDICES**

ISPAN ACTIVITY NO. **624A**

ISPAN REPORT NO. **5**



IRRIGATION SUPPORT PROJECT FOR ASIA AND THE NEAR EAST

Sponsored by the U.S. Agency for International Development



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MID-TERM EVALUATION
OF
THE COMMAND WATER MANAGEMENT PROJECT
VOLUME TWO
APPENDICES

**Prepared for the Water Resources Division
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LIST OF TERMS AND ACRONYMS

ABIANA	-	Crop revenues
ACE-ZCL	-	Associated Consulting Engineers and ZCL, joint venture
ACS/DEV	-	Additional Chief Secretary/Development
ADBP	-	Agricultural Development Bank of Pakistan
AF	-	Acre Feet
A.I.D.	-	United States Agency for International Development/Washington
AKRSP	-	Aga Khan Rural Support Programme
AO	-	Agricultural Officer
ARD	-	Agriculture and Rural Development
ARD, INC.	-	Associates in Rural Development, Inc.
BIRADARI	-	Kinship-based grouping
BLS	-	Baseline survey
CADA	-	Command Area Development Authorities
CHAK	-	The lowest order command, covering about 400 acres and 35 farm units
COP	-	Chief of Party
CWC	-	Coordinated Water Course Program
CWM	-	Command Water Management Project
DA	-	Diagnostic Analysis
EADA	-	Extra Assistant Director Agriculture
EOPS	-	End Of Project Survey
FA	-	Field Assistant
FCC	-	Federal Coordinating Cell
FE	-	Field Engineer
FGW	-	Fresh Groundwater
FSR	-	Farming Systems Research
FY	-	Fiscal Year
GOB	-	Government of Baluchistan
GOP	-	Government of Pakistan
GOS	-	Government of Sind
IDA	-	International Development Association of the World Bank
IDS	-	Institute of Development Studies
IIMI	-	International Irrigation Management Institute
ISM	-	Irrigation Systems Management Project
ISR	-	Irrigation Systems Rehabilitation Project
JIRGA	-	Tribal Council
KATCHA	-	Earthen
KHAN	-	Clan leader
MARKAZ	-	Center of a town or city, or smallest extension services unit
M&E	-	Monitoring and Evaluation
MO	-	Managerial Organization
MOGHA	-	Outlet from the Minor/Distributary
MTP	-	Management Training and Planning
MWP	-	Ministry of Water and Power

NESPAK/NDC	-	National Development Consultants - National Engineering Services (Pakistan) Limited, Joint Venture
NGO	-	Non-Governmental Organization
NIA	-	National Irrigation Administration
NWFP	-	Northwest Frontier Province
O&M	-	Operation and Maintenance
OFWM	-	On-Farm Water Management Program
OPP	-	Orangi Pilot Project
PATWARI	-	A employee who makes the measurements of the crops and prepares assessment statements
P&D	-	Planning and Development Department
PCC	-	Provincial Coordinating Committee
PERI	-	Punjab Economic Research Institute
PHE&ID	-	Public Health Engineering and Irrigation Department
PID	-	Provincial Irrigation Department
PIL	-	Project Implementation Letter
PLL	-	Precision Land Levelling
PM	-	Project Manager
PME	-	Planning, Monitoring & Evaluation
PPA	-	Project Paper Amendment
PPC	-	Provincial Policy Committee
PPW	-	Participatory Pilot Watercourse
SARKARI KHAL	-	Communal Watercourses
SAR	-	World Bank Staff Appraisal Report
SASO	-	Sind Agricultural Supplies Organization
SC	-	Supervisory Consultants for CWM (ACE-ZCL and NESPAK-NDC)
SCC	-	Sub-project Coordination Committee
SCARP	-	Salinity Control and Reclamation Project
SDO	-	Sub-Divisional Officer
SE	-	Superintending Engineer
SMO	-	Sub-project Management Office
SPA	-	Sub-project Area
SPM	-	Sub-project Manager
SRPO	-	Sind Regional Plan Organization
TA/DA	-	Travel Allowance/Daily Allowance
TAT	-	Technical Assistance Team
TDY	-	Temporary Duty Assignment
TEHSIL	-	A small administrative unit at sub-district level
TOR	-	Terms of Reference
TPM	-	Team Planning Meeting
T&V	-	Training and Visit Program
UAF	-	University of Agriculture at Faisalabad
UNDP	-	United Nation Development Program
USAID	-	United States Agency for International Development/Pakistan
WAPDA	-	Water and Power Development Authority
WARABANDI	-	A systematic rotational schedule of irrigation deliveries to farmers served by a single watercourse
WC	-	Watercourse
WMU	-	Water Management Unit
WMS	-	Water Management Systems

WUA
WUAD

- **Water Users Association**
- **Water Users Association Development Specialist**

XEN

- **Executive Engineer**

APPENDIX 1

LASBELA SUB-PROJECT SITE VISIT (BALUCHISTAN PROVINCE)

1. Circumstances of Visit

The team visited the Lasbela Sub-project on 16 August 1988, at which time it participated in group discussions with personnel from the SMO and TAT and toured the project site. Follow-up visits to the SMO and various sub-project locations by individual team members occurred on 20 and 22 August. The team additionally discussed project matters with the SPM in Karachi on 19 August and with the TAT on 16, 19, and 22 August. Russell Betts and M. I. Chishti discussed the sub-project with Baluchistan Provincial Authorities in Quetta on 22 August. The sub-project was also discussed during various conversations with Government of Pakistan and donor authorities in Islamabad and elsewhere from 10 August through 12 September.

2. Background

2.1 Physical Setting

The sub-project site is situated in the south-western part the district of Lasbela, approximately 20 miles away from Karachi in the west. It is a sparsely populated region in which, according to a 1981 census, approximately 14,000 people lived in an area of approximately 34,000 acres. Of these, nearly 6,000 people inhabited the sections which came to comprise the irrigated left bank of the Lasbela canal when that structure was first commissioned in 1983. Prior to that time, the entire region was a barani, or rainfed agriculture, area.

The climate in the Lasbela region is arid, marine, and tropical: May and June are the hottest months, while the winter lasts from December through February. Rainfall occurs mostly in the summer, and the seasonal humidity is highest between August and October. The area is located in the Hub river basin, and the slopes are relatively steep, extending from the base of the hills in a fairly regular pitch down toward the Hub river. This enabled development of a rudimentary catchment system for hill torrent runoff, known locally as "Roht Khoi", as well as construction of numerous weirs across the major streams to divert water through small channels to provide for seasonal water supplies for short periods of time.

Until recent times, canal irrigation was not possible in the Lasbela region, due to the seasonal limitations on water flow in the Hub river. This situation changed in 1982, when construction was completed on a high earthen dam across the Hub in order to impound some 0.77 maf of water. This project enabled storage of water sufficient to supply the 5.2 mile long Karachi Irrigation Project main canal as well as the Bela Canal, which is approximately 20 miles long. The Bela Canal was designed for 160 cfs to irrigate 21 thousand acres on the Hub's right bank, as well as to supply nearly 15 MGD of water to the proposed Hub Industrial Trading Estate, which is immediately adjacent to the CWM sub-project area.

The sub-project covers the area commanded by the first five minors of the Lasbela canal, comprising a cultivable command area of 12,000 acres. As the area received its first irrigation supplies only in 1983, it is still in its inaugural stages of transition from barani to irrigated agricultural development: cropping intensities as low as 15 percent were recorded in the 1983 feasibility studies which led to the inclusion of Lasbela in the CWM project, and the expectation was that rates might rise substantially as a result of the project. Cropping patterns for both growing seasons were reported to be nearly the same, with vegetables, orchards, fodder, and pulses being grown, and with only wheat being added to that cropping pattern during the Rabi growing season.

The introduction of the Lasbela canal has given rise to drainage problems which were not anticipated in 1983. The soils in the Lasbela region are extremely porous, which when combined with the natural slope of the entire region led to expectations that drainage would be no problem. As it turned out, however, the bedrock in the region is quite shallow, sometimes only 5 to 10 feet below the normal ground surface, and the porosity of the soils led to serious seepage problems from the canal, as well as from the unlined minors and watercourses which flowed from it, which in subsequent years has created growing problems with waterlogging and salinity.

2.2 Socio-economic Circumstances

The Las Bela Canal divided the indigenous community and its traditional rangelands into two distinct areas: those villagers whose land came under command are the beneficiaries of irrigated agriculture, and those whose lands are on the right bank continue to live off rainfed agriculture. People from the same village are now contending with the challenges of two agricultural systems. One of them, the traditional rainfed system, is combined with a pastoral orientation; the other, the modern irrigated system, has a growing element of cash cropping and land speculation.

The command area is farmed by indigenous landlords and tenants, as well as by corporate farmers from the nearby Karachi urban areas using hired labor from among the indigenous population. Farmers are experimenting with a large variety of crops, including some they are growing for the first time, and some that have not been grown in Pakistan on a large scale before (e.g., coconut and paan).

Corporate farmers (many of whom started farming in Las Bela as Friday Farmers) grow cash crops, such as papaya, coconut, paan and cheeko, for external markets. They collect information on the new crops by reading books, subscribing to magazines, and talking to experienced agricultural scientists; some have even hired their own agronomists. Since they have large farms, these farmers also have the freedom to set aside a small part of their farms for experimentation. According to the TAT Agronomist, these farmers can be helped at a low cost to the project, simply by telling them where to look for appropriate inputs and information. Many of them have developed farms that could compete in technical and economic terms with some of the finest establishments in the business, even though the payoff takes some time to materialize.

The indigenous farmers are subsistence oriented, though many of them sell small amounts of their agricultural output (e.g., various types of fodder) to the markets in Karachi. Since the Lasbela canal closed off part of their rangelands, indigenous farmers have sold off their livestock. These farmers are now slowly learning the ways of irrigated agriculture. As one farmer said, "Rainfed agriculture is a struggle against nature. Irrigated agriculture is a struggle for capital." Most of these farmers are using fertilizer for the first time.

The one priority that is common to both corporate and traditional farmers on the left bank, as well as significant numbers on the right bank, is a program to eliminate waterlogging and salinity. The seepage from the canal has rendered large tracts of land useless, and is continuing to inflict more damage. Farmers on both sides of the canal are in a state of despair. An old woman on the right bank (outside the command area) described how she had witnessed the effects of seepage: "The first year was good. The second year, the palm tree bore smaller fruit. In the third year, the fruit turned bad. Since the fourth year, the tree has been giving shrivelled fruit that we can't eat. Whenever we were hard up because of drought, we could always count on the palm. We can't do that any more, because the water has destroyed the palm tree. We should have been left to nature and the rains."

Beyond seepage control/elimination, the needs of the traditional farmers diverge sharply from those of the corporate farmers. The project needs to articulate a strategy that can help the traditional farmers make a productive transition to irrigated agriculture. It is quite likely that increasing land values and the closeness to Karachi will result in corporate farmers buying or forcing out smaller farmers within a generation. Even so, traditional farmers need special attention, so that they can improve their incomes during the transition to whatever the next phase may be for them, and so that they may acquire farming and organizational skills that may serve them well subsequently. The TAT and SMO need to recognize the special needs of these farmers, as distinct from those of the corporate farmers.

Traditional farmers face the challenge of growing crops that they had not grown before, and doing so on sandy (and occasionally waterlogged) soils. The project could begin to address the difficult issue of crop-water-soil interaction in order to assist farmers. How much irrigation makes sense? How can nitrogen from chemical fertilizer be applied most effectively on leaching soils? Are there varieties that are more suitable for sandy and waterlogged soils than those currently used?

With agricultural and urban development, there will be growing pressure on existing forest resources within the project area. At present, most farming communities in the area depend on wood gathered locally for cooking and heating. Wood-gathering involves women. As forest resources are depleted, there will be pressures both

on women's time and the family's cash resources. Community or individual woodlots may be an option worth exploring with the traditional farmers. Vegetable cultivation, including that by women in kitchen gardens, could possibly benefit from improved seed and varieties.

Women are involved (despite the occasional denial of proud men) in weeding, harvesting, collection of firewood, fodder collection, fetching water, vegetable cultivation in home gardens and animal husbandry. Women's activities represent a potential area of positive intervention for the project that has not yet been explored. Some suggestions are given above, and other options can be identified by means of analysis focussed on women.

3. Sub-project Activities

It should be noted at the outset that the Lasbela sub-project had an extremely slow start. In contrast to some of the other SPAs, activities didn't actually begin until November 1986, when the SPM was appointed and the SMO was activated. Actual sub-project plans were prepared by February 1987, but various delays followed, often stemming from questions from the World Bank (regarding canal rehabilitation) and others, frequently along the lines of "Why are things so different here from the other projects?"

3.1 Sub-project Management Office

The Lasbela SMO is located immediately adjacent to the sub-project area, approximately 40 minutes outside of Karachi.

According to the SPM, recruitment of the SMO staff initially was quite difficult and staff turnover was high, primarily because adequate housing and other incentives were not provided and living conditions in Lasbela were not desirable. Similar problems continue, but now to a lesser degree.

The SPM also reports problems acquiring adequately trained or skilled staff. The key reasons suggested for this include:

- many of the non-civil works skills required by CWM simply are not available anywhere;
- many of those people who possess appropriate skills or experience would not be interested in moving to a temporary project office (SMO) for an experimental project (CWM). For many people, this would not be advantageous from the perspective of career advancement.

3.2 Civil Works

Civil works issues have dominated CWM activities in the Lasbela SPA perhaps more than in any other CWM area. This is due to a combination of technical factors, which require that considerable attention be paid to the construction aspects, and social factors, which immensely complicate progress in several of the non-civil works areas. It probably is reinforced by the fact that the SPM is a PID engineer whose professional interests and skills focus on civil works issues, and by the fact that the SMO staff is dominated by personnel with similar background and interests.

The technical difficulties include the instability of the main canal, the need to assure adequate run-off channels for the rain torrents, the high levels of seepage which accelerates the waterlogging and salinity problems, the resulting need to plan for and construct surface and subsurface draining systems, and the problems the project appears to have experienced in assuring the required quality, and quality control, in its civil works construction activities. These difficulties are likely to have been reinforced by the difficulties the SMO reportedly had, especially during the earlier phases of CWM implementation, in recruiting and retaining the staff it required to manage its activities.

All of these factors have contributed to the degree to which the sub-project is seriously behind schedule in its civil works program, even when its late start is taken into consideration. Overall targets and achievements are as follows:

Targets (to FY88) and Achievements

	Target	Achv.
1. Canal Rehabilitation and Remodelling:		
(a) canal rehabilitation (mi)	14.7	0
(b) minor lining (mi)	11.6	4.0
(c) outlet remodelling (no.)	61.0	0
2. Drainage:		
surface drainage (acres)	3,150	Under Prep.
3. On Farm Water Management:		
(a) watercourse renovation (no.)	60	0
(l) demonstration plots	60	0
(c) precision land-levelling (acres)	300	0

Currently, the SPA finally has a civil works program that is attempting to match project targets through appropriate staffing. On the watercourses, the alignment appears to be satisfactory but the construction seems fragmented and of poor quality, especially at contraction/expansion joints. There may be valid reasons for the apparent fragmentation (fabrication of gates, for which approval by IBRD was held up until April 1988), but poor quality is another matter. In particular, the lack of adequate supervision along the watercourses leads to bad quality construction and no quality control.

Many early technical problems with seepage (up to 60 percent losses), led to a raising water table close to surface. There is a need to deal urgently with drainage problems, but increasing salinity and waterlogging is not yet being effectively dealt with.

3.3 Non-civil Works

3.3.1 Water Users Associations

The Las Bela sub-project was delayed in starting its civil works program, and it has been further delayed in its non-civil works components. Since the civil works have to be completed according to SAR targets, this has become the main focus of activity for SMO staff and the government. Non-civil works staff have been recruited to the SMO only recently, and the Agricultural Extension Directorate has made plans for demonstration plots but not yet implemented any of these. Both SMO staff and cooperating agencies are still feeling their way through uncharted territory.

Staff concerned with WUA development are also confounded by the uncertainties associated with the land tenure issue. Uncertain land tenure has led to slow formation of WUAs and a paucity of activities that could be developed to sustain the WUAs. Even though the land tenure issue is still under consideration of the Provincial Government, the formation of WUAs is accelerating: the project had only 5 WUAs three years after its formal initiation, but now there are 21. The earlier opposition from the farmers is being overcome gradually. In fact, farmers are beginning to make requests, through their WUAs, for drainage and other design changes. This may be seen as a positive step toward effective WUAs.

Although a full social understanding of the area hasn't been prepared, it is clear that there are different types of farmers in this area, that the social structure is in flux, that the small farmers are in threat of being pushed

out (because of increasing land values). All of this poses a unique challenge to devise programs and mechanisms suitable for the SPA. As yet, there is no systematic approach to WUA activation and support: the SMO and TA Team have not developed any effective perspective or strategy for dealing with the two separate kinds of farmers operating in a rapidly-changing environment.

Efforts to enlist WUAs for watercourse renovation have probably not stressed participatory processes. Farmers claim not to have been informed that in addition to providing the labor they also would have to pay a portion of the costs of rehabilitation and lining. This led to some resistance and work stoppages when they found out. Clearly, considerable effort is needed to involve different types of farmers in the process of WUA registration and watercourse renovation. WUAs have to be organized as effective and cohesive farmer groups, not merely as legal entities with thumb-impressions that help fulfill the project's civil works targets. The SMO needs to view the WUA institution-building process as a (probably long) process of gaining farmer confidence and promoting cohesion before the WUAs can be considered effective for the purposes of the project.

3.3.2 Extension Services (Demonstration Plots, involvement of the Extension Department, Farmer Days, etc.)

The Lasbela SMO indicates that it does not have sufficient extension staff, that those it does have are not adequately trained for CWM-type activities, and that this prevents it from properly carrying out an effective extension program. This situation, if true, needs to be rectified. When it is, the SMO's extension efforts need to pay specific attention to the situations of the two major groups of farmers, traditional and corporate.

According to the TAT Agronomist, corporate farmers can be helped at a low cost to the project, simply by telling them where to look for appropriate inputs and information. Many of them have developed farms that could compete in technical and economic terms with some of the finest establishments in the business, even though the payoff takes some time to materialize. It would appear, therefore, that the project could make a significant contribution to the SPA's large corporate farmers with a relatively small input of staff time. If this is correct, then the bulk of the staff time should be devoted to extension efforts for the small traditional farmers.

The indigenous traditional farmers are slowly adjusting to the techniques of irrigated agriculture. They are adopting new cropping patterns and most of them are using fertilizer for the first time.

Beyond seepage control/elimination, the needs of the traditional farmers diverge sharply from those of the corporate farmers. The project needs to articulate a strategy that can help the traditional farmers make a productive transition to irrigated agriculture. It is quite likely that increasing land values and the closeness to Karachi will result in corporate farmers buying or forcing out smaller farmers within a generation. Even so, traditional farmers need special attention, so that they can improve their incomes during the transition to whatever the next phase may be for them, and so that they may acquire farming and organizational skills that may serve them well subsequently. The TAT and SMO need to recognize the special needs of these farmers, as distinct from those of the corporate farmers.

Traditional farmers face the challenge of growing crops that they had not grown before, and doing so on sandy (and occasionally waterlogged) soils. The project could begin to address the difficult issue of crop-water-soil interaction in order to assist farmers. How much irrigation makes sense? How can nitrogen from chemical fertilizer be applied most effectively on leaching soils? Are there varieties that are more suitable for sandy and waterlogged soils than those currently used?

With agricultural and urban development, there will be growing pressure on existing forest resources within the project area. At present, most farming communities in the area depend on wood gathered locally for cooking and heating. Wood-gathering involves women. As forest resources are depleted, there will be pressures both on women's time and the family's cash resources. Community or individual woodlots may be an option worth exploring with the traditional farmers. Vegetable cultivation, including that by women in kitchen gardens, could possibly benefit from improved seed and varieties.

Women are involved (despite the occasional denial of proud men) in weeding, harvesting, collection of firewood, fodder collection, fetching water, vegetable cultivation in home gardens and animal husbandry. Women's activities represent a potential area of positive intervention for the project that has not yet been explored. Some suggestions are given above, and other options can be identified by means of analysis focussed on women.

3.3.3 Improved Water Management: Precision Land Levelling

The SMO would like to pay attention to PLL on a priority basis as soon as staff and funds are available. The discussion of PLL in the main text of this evaluation report should be considered carefully before undertaking any large scale PLL program.

3.3.4 Matching Crop-water Requirements with Available Water

The SMO has indicated that the TA Team could play a leading role in identifying certain interventions for improved water management. The SMO's plans may benefit from the experience of other SPAs and the outcome of ongoing water management plans there.

3.3.5 Credit

The SMO reported that Rs. 1 million in credit had been given to the SPA's farmers by local banks. No documentation was presented in support of this, nor is there any indication of how the credit was utilized and who might have benefitted from these loans. If experience elsewhere in the country is any guide, the chances are that the credit was for large farmers and some of it was never used for agricultural development in the SPA.

As the main body of this report argues, there are serious constraints on the ability of the SMO to arrange credit for large numbers of farmers. The SMO should evaluate its experiences in order to decide whether its efforts have had an impact on many farmers and whether they represent a cost-effective deployment of project time and resources.

3.3.6 Special Activities

Little evidence was presented to suggest that the Lasbela SMO had developed plans or inaugurated activities designed to systematically incorporate supply of inputs such as seeds, fertilizers, farm implements, etc. in any of its plans or programs.

4. Institutional Development Issues

4.1 Monitoring and Evaluation

The whole concept of M&E seems poorly comprehended, and at the moment addresses only the engineering issue of water flow measurement and allocation.

In fact, no effective means to measure/evaluate project impact seem available at the Lasbela SPA. The SPM reports that his difficulties in acquiring qualified staff for his M&E have not been especially acute.

4.2 Baseline Survey

No baseline work has been done by the project. No knowledge about previous land tenancy, productivity, or cropping patterns. Monitoring and evaluation to mean periodically monitoring water flow as a basis for

determining allocations among and within commands. The only baseline data mentioned by anyone was that which was contained in the 1983 WAPDA pre-feasibility study, and the validity of that data is unclear because of uncertainty regarding how it was collected (and verified).

4.3 Water Management

There is little evidence of much work relating to water management, except for some training (see training and monitoring, below) regarding measurement of water flows. One did not hear much discussion about standards for desired irrigation efficiencies.

The SMO appreciates the work done by the TAT Water Management Specialist; he has done mostly training relating to water flow measurement and thus is involved in engineering-type technology transfer of direct relevance to an engineering focus of efficiencies in civil works. It is not clear, however, that line agencies are extending the kind of staffing and support that could lead to institutional development based on the work with water management.

4.4 Sub-project Coordinating Committees

The LasBela SCC meetings have been held at the sub-project offices, and are reported to be comparatively free-wheeling and sometimes chaotic. The evaluation team was shown evidence of this, via a video film which portrayed a noisy gathering around a large table in a crowded room where most people seemed to be talking and few appeared to be listening. The team was advised that while the meetings gave everyone, especially the WUA representatives, an opportunity to express their grievances and opinions, they tended to generate bad feelings more often than they led to the resolution of issues which had been raised.

4.5 Provincial Coordinating Committees and Federal Coordinating Cell

No significant information regarding these units were received by the evaluation team at the Lasbela SPA.

4.6 Inter-agency Coordination/Cooperation

The Lasbela SPM indicated that he has good access to provincial authorities, who have assured him of their full support for whatever he recommends as necessary for successful project implementation and completion. He claimed that the Lasbela SMO has considerable latitude in project management, because of the unique circumstances in the Baluchistan provincial government, which is an "open" bureaucracy. This seemed confirmed when members of the evaluation team visited Quetta, and were impressed to the interest shown there in the project by senior provincial officials, and by their demonstrated willingness to take a strong hand in addressing potential problem areas when these were presented to them.

Such a situation apparently did not always exist, as in the early days of the project there reportedly were a series of jurisdictional disputes at the provincial level over project issues which slowed the flow of funds and otherwise impeded implementation. One indication of the "success" of the project thus far might be the degree to which such disputes now seem to have been resolved. As members of the evaluation team were told in a meeting with provincial authorities including the Secretaries of Irrigation and Agriculture. "CWM is being successful. Before the project, we could not even sit in the same room and try to resolve our differences as friends. Now we do so regularly. This is because of the project."

Concurrently, however, the SPM suggests that problems remain at the operational level, due primarily to the number of different actors who are involved in the project who do not report to any single authority. In this situation, according to the SPM, if anything goes wrong there are "too many actors, all blaming each other." Also, the different agencies frequently "do their own thing" using their own money in the project area, often without attempting to coordinate or integrate their activities with those of the CWM project. The TA

Agricultural Extension specialist reportedly has attempted to help define the relationships among these various actors, but this remains a continuing challenge.

5. General Issues

5.1 Productivity/Equity Issues

On the basis of Lasbela experience thus far, there is little evidence that project is able to influence any aspects of the increased productivity matrix other than bringing adequate and equitably distributed irrigation water to the crop root zones during peak water requirement periods within current or projected cropping patterns. So far all that the available data or evidence permits as the observation that crop intensities are reported to have improved since 1985/86, thus proving that water makes things grow. The other key elements (ag inputs such as seeds/fertilizers/pesticides, market access, extension, etc.) are not yet being integrated into the process.

The SPM indicated to the evaluation team that watercourse lining costs to the farmers are higher than the prescribed (in the project documents) ratios (of 25 percent farmers, 75 percent donors/GOP), that this is working a severe hardship on the farmers, and that there is no flexibility in project management to do anything about it.

A comparable problem is reported to exist with regards both assessments and repayments.

5.2 Issues of Farmer Contributions

A.I.D. documents say it pays 75 percent of lining costs, the farmers pay 25 percent. The SPM claims that in fact farmers pay closer to 50 percent in actual costs, plus an additional 25 percent for imputed labor, therefore ratios are reversed. One of the issues has something to do with lining on land which does not belong to the farmers, but to which they must contribute. The SPM says this should be changed through a project amendment which would enable USAID to pay 100 percent in some areas, to rectify the difference.

5.3 Consulting Services

The SMO and the TAT need to come to a clearer set of understandings and agreements regarding priorities and procedures.

TAT should be assigned to specific sub-project sites on a rotational basis. SMOs could make better use of them if their presence was more predictable and stable. Visits should be scheduled to maximize TAT presence at sub-project sites (i.e., longer periods of time).

6. Lessons Learned (or Learnable) of Potential Replicability

6.1 Observation

- CWM is being implemented in Lasbela through an entity (SMO) which is essentially a Project Management Unit (PMU), which inherently has no permanency and therefore cannot, in and of itself, contribute to sustainable institutional development.**
- One of the items most conspicuously missing in Lasbela is any capacity to identify lessons learned as the project evolves, and then develop an institutional capacity to make use of these in planning and project implementation.**

- **Differences between OFWM and CWM seem to be understood at the management level, but there is not much evidence that these two are differentiated or implemented differently below that level.**
- **A definition of what water management might really mean in the Lasbela context is needed. Then a water management plan which realistically can be implemented by farmers and SMO staff needs to be developed.**
- **There is as yet little understanding of the social and land use dynamics in Lasbela. No matter how complex this might be, such an understanding, as a prerequisite to devising appropriate strategies for WUA activation, is essential.**
- **There is little evidence thus far that, except through making additional water available more reliably, the Lasbela sub-project has planned or inaugurated any meaningful water management activities. The other key elements (ag inputs such as seeds/fertilizers/ pesticides, market access, extension, etc.) are not yet being integrated into the process.**
- **CWM is being implemented through an entity (SMO) which is essentially a PMU, which inherently has no permanency and therefore cannot, in and of itself, contribute to sustainable institutional development.**
- **The most noteworthy observed adverse environmental impact was waterlogging and induced salinity due to water seepage from the canal. This situation was responsible for the reports (also confirmed by observation) of farmers losing land and livelihoods to salination.**

6.2 Recommendations

- **Focus project beyond civil works issues, which currently dominate and skew thinking about the project priorities.**
- **Improve quality control, and strive toward managing the project so that it can construct complete systems.**
- **The TAT needs to make its changed approach to WUA development clear to the SMO and to obtain its approval to proceed as now planned.**

Lasbela Background Statistics

Gross Area (000 acres)	34
Command Area (000 acres)	12
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	31
- public tubewells	-
- private tubewells	NA
- Total	31
Crop Water Required (000 ac/ft annually) at Watercourse Head	-
Average Crop Yields, FY81, kg/ac:	
- kharif	
Rice	-
Cotton	-
Maize	-
Sugarcane	-
Fodder	5,580
- rabi	
Wheat	400
Fodder	9,100
Estimated Incremental Cropping Intensity (%):	
- present (P)	15
- future, without project (w)	40
- future, with project (W)	115
- increment W over w (%)	188
- increment W over P (%)	667
Projected Net Farm Income (000 Rs) Per Capita:	
- present	0.6
- future, without project	1.2
- future, with project	4.1
- increment with over without project (%)	250

Source: World Bank, Staff Appraisal Report: Pakistan, Command Water Management, April 1984.

APPENDIX 2

SEHRA-NAULAKHI SUB-PROJECT SITE VISIT (SIND PROVINCE)

1. Circumstances of Team Visit

The Evaluation Mission visited the Sind sub-project area (SPA) on 17 and 18 August 1988. The visit started with a one-hour briefing at the SMO in Kandiaro, attended by SMO staff, line agency representatives and the supervisory consultants. Afterwards, lunch was organized at the residence of a notable landlord-politician who is also the Chairman of one of the WUAs. The post-lunch program consisted of inspection of renovated minors and watercourse; Tariq Husain separated from the rest of the evaluation team in order to discuss individual programs and corresponding data collection with Aftab Qureshi, Deputy Director, PME, and John Smith, the TA Team's FMS.

On August 18, Russell Betts and Gene White visited several renovated watercourses in the company of Azizullah Tunio, the SPM, and approximately 7 jeep-loads of SMO staff and collaborating professionals. M.I. Chishti, Peter Reiss and Tariq Husain proceeded on separate visits to pursue issues of specific interest to their work. Mr Chishti and Dr Husain thoroughly examined the M&E data collected by the SMO in the presence of Mr Smith of the TAT and Mr Qureshi of the SMO. Subsequently, Mr Chishti inspected the civil works in the company of the supervisory consultants, while Dr Husain visited one unimproved watercourse and one renovated/coordinated watercourse and met with 10-12 tenants and owner-tenants. Dr Reiss also spent much of his time meeting with farmers, with whom he discussed project (particularly WUA) activities. The Evaluation Mission was informed by the SMO that dacoits were still active in the SPA and that this posed a security problem, particularly for foreigners; accordingly, the Evaluation Mission was restricted in its travel within the SPA.

Lunch on August 18 was again taken at the residence of a local notable who is also the Chairman of one of the WUAs. After lunch, the Evaluation Mission drove straight to Sukkur for the flight to Karachi.

Throughout the visit, the Evaluation Mission enjoyed the company and hospitality of a large number of line agency and SMO staff, headed by Mr Tunio the SPM. This gave team members the opportunity to speak with SMO staff during jeep rides and site visits; it also resulted in the Evaluation Mission travelling in a caravan of jeeps and officials that at times seemed rather overwhelming, and may have been somewhat intimidating to the various farmers with whom Team members attempted to discuss project activities.

On August 21 the Evaluation Mission met with GOS officials, including the Chief Economist, P&D, Additional Secretary, Irrigation and Additional Secretary, Agriculture. Dr Reiss and Dr Husain also visited SRPO and met with the new Director (Agriculture).

2. Background/Setting

2.1 Physical Setting

The Sind sub-project area consists of lands irrigated by the Sehra and Naulakhi branches of the Rohri Canal (ex-Sukkur Barrage). The Sukkur Barrage system is more than 50 years old. The Sehra and Naulakhi branches were designed for a cropping intensity of 81 percent (24 percent in kharif and 57 percent in rabi); before the CWM project started, reported cropping intensities were 105 percent in Naulakhi and 118 percent in Sehra [WAPDA, 1983b]. There are reported to be 254 public tubewells (of 3-5 cusecs each) and 200 private tubewells (of 1 cusec each) in the sub-project area, which operate for eight hours each day. Crop water requirements at the time of project appraisal were estimated to be 650,000 ac/ft, against available irrigation supplies of 551,000 ac/ft [World Bank, 1984].

The cropped command area is 163,700 acres; in 1981, the sub-project area had a population of 1.2 million. The major kharif crop is cotton, and the main rabi crop is wheat. Because of the shortage of water, rice

cultivation is permitted only on saline soils; while saline area is reported to have remained more-or-less constant, the area under rice has been increasing in recent years.

The WAPDA feasibility study for the CWM project [WAPDA, 1983b] reports fertilizer use of 30-50 kg/ac of nitrogen and 21-38 kg/ac of phosphate in the sub-project area. This study also estimated that certified seed was used by 3-6 percent of the wheat farmers and 9-15 percent of the cotton growers. Although statistical data on crop varieties are missing, it is reported that most farmers plant a mixture of Mexi-Pak and local wheat varieties, locally known as New Mexi. The adulterated stand presumably represents a compromise between the high grain yields of Mexi-Pak and the high straw yields of local varieties. In recent years, cucumber cultivation has increased dramatically, particularly on small farms. It is said that a local arhti (commission agent) brought seed from Karachi about 3-4 years ago, when he realized the potential for cucumber.

2.2 Socio-economic Circumstances

Tenancy is widespread; about two-thirds of the farms are tenant operated [USAID, 1985]. In general, the landlord and tenant share production and input costs on a 50-50 basis (except that the landlord pays the water charges and the tenant is fully responsible for tractor rental charges and cleaning the watercourse). Landlord-tenant relationships also include other elaborate economic and social rights and responsibilities. Seasonal workers (including women cotton pickers) come from as far away as Tharparkar and Hyderabad. In addition to Sindhis, the major ethno-linguistic groups are the Baloch and the Brohi.

The SPA has witnessed a wave of lawlessness in recent years, including kidnapping for ransom and holdups. This has adversely affected the mobility, and hence performance of SMO staff and the TA Team. The arrival of army contingents in the area has led to an improved situation.

3. Sub-project Activities

3.1 Civil Works Goals

Under the IDA component of the project, lining is being carried out from among those minors that have a discharge of 10-30 cusecs. The project calls for lining of 73 miles of minors and distributaries, and the remodelling of 360 outlets (moghas).

Under the USAID (OFWM) component for civil works, 360 of the 451 watercourses in the sub-project area will be improved; 15 percent of the length of the watercourses will be lined with cement-brick, for a total of 292 miles (1.54 million ft) of lining.

The lining of minors and distributaries is expected to save 16,750 ac/ft; renovation of 360 watercourses is expected to save 97,900 ac/ft [World Bank, 1984]. If total water savings of 114,650 ac/ft materialize as envisaged in the appraisal, then the civil works improvements would result in overcoming the water deficit of 99,000 ac/ft estimated at appraisal.

3.2 Non-civil Works Goals

Each renovated watercourse is expected to have a WUA, for an SPA total of 360. Similarly, the project calls for one demonstration plot per renovated watercourse as part of the OFWM component. The last element of OFWM is precision land levelling on 6,800 acres over the life of the project.

The project requires considerable attention to improved inter-agency coordination and farmer participation in order to provide farmers with timely and reliable supplies and services in the non-water sectors.

As a result of the civil works and the non-civil works inputs, the project appraisal estimated that with-project cropping intensities would be 15 percent higher than without-project cropping intensity in the SPA; and that

yields per acre would be 30 percent higher for cotton and 40 percent higher for wheat. It was also estimated that the project would increase per capita farm incomes by 22 percent. Overall, the Sind sub-project is expected to have a rate of return to investment of 36 percent, the highest among the seven sub-projects.

3.3 Organizational Issues

In Sind, the lead agency for the project is the Department of Agriculture. At the time of project design, the Irrigation Department in Sind felt that, since the project entailed considerable agricultural and on-farm work, it could be best managed by the Agriculture Department. GOS has indicated that the present arrangement will continue if there is a second phase of CWM.

The World Bank SAR mentions that, in addition to the SMO at the project site, and the PPC, "Sind Province will have a small cell (two professionals) located in Karachi. It will be assigned to Sind's P&D and will serve a coordinating and facilitating function."

3.4 Sub-project Management Office

The SPM was appointed in April 1984, and established an office at Kandiaro in May 1984. The SPM belongs to the Provincial Agriculture Department. In his personal capacity, the SPM appears to enjoy good working relationships with collaborating agencies, and this is reflected in the array of coordinated efforts within the SPA.

The SPM takes a fatherly view of impoverished farmers and their problems. He encourages farmers to bring their problems to him for resolution. He often expresses the conviction that farmers in Sind will readily respond to development interventions if they are offered the necessary incentives.

The Sind SMO has a large staff of 146 that represents all the staffing components of the CWM project; the project also has numerous vehicles and motor cycles available to the SMO.

Staff recruitment started in July 1984. Both the civil works consultants were appointed in November 1985. The TA Team started working with the SMO in April-May 1987. The SMO includes five field teams for civil works, each headed by an Assistant Director and including 2 Water Management Officers, 4 Sub-engineers and 4 Rodmen; these teams have been transferred from the OFWM project. The field teams are part of the Water Management Unit (headed by a Deputy Director), which also includes an Irrigation, Extension and Water Management Unit.

The large staff has been built up over the years partly through the SPM's personal efforts, and partly by taking advantage of the former Prime Minister's employment program for educated unemployed youth; the latter avenue led to the much-needed strengthening of the PME unit in late-1987.

The staff of the Sind SMO are drawn mostly from the OFWM Directorate of the Agriculture Department. Given the large staff size, there is significant variation in staff quality, reflecting, in general the availability of staff in the Provincial Departments. SMO staff represent considerable expertise in conventional OFWM project activities, particularly watercourse renovation, WUA registration, and demonstration plots. Areas in which staff expertise is relatively inadequate include: WUA organization and support; planning, monitoring and evaluation; improved water management techniques; transfer of agricultural technology; and, credit, marketing and input supply. There are no women on the staff of the SMO, and this might be one factor explaining the continuing lack of attention to income-generating or labor-saving programs for women.

As part of the training program for the project, SMO staff participated in the Diagnostic Analysis workshop held in 1985. They also participated in the preparation of the project management plan to address the priorities identified in the Diagnostic Analysis. Field staff have been given training in agricultural extension in five sessions held during April-June 1988. PME staff have been trained in the use of cut-throat flumes. Two individuals responsible for WUA activities were trained in August 1988.

The Sind SPA is located in a part of the Province for which it is hard to recruit staff from the Provincial

Departments. The SPM reported that nobody has ever yet sought a position with the SMO: staff has had to be requested specially by the SPM.

3.5 Relations with Other Relevant Agencies

The SMO's relations with relevant agencies are good: numerous examples will be given below of coordination in pursuit of project goals.

Three watercourses on the Darbelo Minor have been chosen as coordinated watercourses. These watercourses have been selected as sites for intensive and coordinated efforts by cooperating agencies.

The SPM feels that all concerned cooperating agencies should have a responsible officer located in the sub-project area, and that a PID XEN should be made responsible full-time for the project. In addition, the TA Team should be located in the sub-project area, at least for longer durations than is possible under present arrangements. At present, the TA Team spends a considerable portion of its time at its offices in Karachi, or travelling between Karachi and the sub-project.

3.6 Civil Works

3.6.1 Sub-project Goals

The civil works targets for the SPA are summarized below.

<u>Targets (to FY88) and Achievements</u>			
		Target	Achv. Apr88
1.	Canal Rehabilitation and Remodelling:		
	(a) canal rehabilitation (mi)	87	60
	(b) minor lining (mi)	55	16
	(c) outlet remodelling (no.)	360	226
2.	On Farm Water Management:		
	(a) watercourse renovation (no.)	300	219
	(b) watercourse lining (000 ft)	1,284	
	(c) demonstration plots		
	target @ 1 ac per renovated watercourse	300	80
	(d) precision land levelling (acres)	6,800	

3.6.2 Sub-project Activities

The civil works component has seen the greatest progress among project objectives and targets. It appears to have attracted the immediate and considerable attention of both project staff and farmers. So far, 246 watercourses have been renovated under the USAID component for OFWM.

The alignment of minors and improved watercourses appears to be satisfactory, but supervision seems to be lacking. The provision for quality control is inadequate - the supervisory consultants have provided for only 5 days in a month on the site.

It is recognized by the SMO that civil works kindle the enthusiasm of farmers, and the completion of civil works (particularly watercourse improvement) results in lack of interest in additional cooperative endeavor: the WUA becomes dormant or dead. Thus, additional lining is perceived by the SMO as a way of keeping the WUAs alive and active. This factor has been cited by the SMO as part-justification for USAID funding for additional lining of watercourses. It needs to be kept in mind, however, that additional lining is a one-time activity that cannot

keep WUAs alive on a continuing basis: it cannot be a substitute for more effective income-generating programs in non-civil works categories that can sustain the interest of WUAs on a continuing basis. The project has now devised criteria for additional lining of watercourses in the Sind SPA. These criteria include both techno-economic and social organizational considerations. It has been proposed that additional lining on renovated watercourses be funded on a 'critical areas' basis, provided that the WUA is determined to have the capacity to maintain the watercourse and participate effectively in the programs designed for WUAs.

3.7 Non-civil Works

Timely completion of civil works has been the major pre-occupation of the Sind SMO so far. In fact, staff from all sections were assigned to the civil works program until physical targets were achieved. This attention to civil works has cost the SMO some critical lead time in developing interventions in other areas, such as WUA motivation and sustainability, technology transfer, input supply, credit and marketing. The result is that both farmers and the SMO continue to view civil works, particularly watercourse renovation, as the major development activity for WUAs and the *raison d'être* for the project: watercourse lining is viewed as the only option to keep the WUAs alive and functioning.

The Sind SMO has registered 344 WUAs. The WUAs have been most visibly employed in the construction of civil works.

The SPO now has two individuals working full-time with the WUAs, one WUADS and one Rural Sociologist; both are funded by USAID and have one-year contracts. Their responsibilities are to work with WUAs on the three coordinated watercourses, select and organize a fresh watercourse using a participatory approach, and spend the remaining one-third of their time working on other project area sites under the supervision of the SPM.

The WUAs have been registered under the Sind Irrigation Water Users Act of 1982, which restricts membership to landowners. The result is that the WUAs, in practice, often end up channelling project resources disproportionately to the larger landlords. Thus, the project's objective of farmer participation in the management of irrigated agriculture is short-changed. Suggestions have been made to amend the Act to open up the membership to include tenants, but GOS feels that: (a) since tenants move from one plot of land to another, only landowners provide a secure source of cost recovery; and, (b) only landowners can provide collateral (e.g., immovable property) that can be attached in case of default. These are very important considerations from the point of view of cost recovery for watercourse renovation. Perhaps an alternative approach to the project would have been to separate the legal requirements for watercourse renovation from the other participatory elements of the project, for example, by writing out a contract for renovation and cost recovery with landowners, while opening up WUA membership to all water users so that they may participate directly in other project activities.

The project area of the Sind SMO is dominated by landlords (*waderas*), many of whom have become the Chairmen of their WUAs. The *wadera* can and does use his feudal authority to organize labor and other resources for watercourse improvement. The WUA, therefore, reinforces traditional landlord-tenant relations. Put differently, the traditional feudal system is extended to the WUA and leads to effective implementation of the civil works program by the WUA. Thus, the civil works program and the feudal system are mutually reinforcing. Judging from the progress to date, this appears to be an efficient arrangement; whether or not it also is, or can be made, equitable is open to question.

There is no evidence that the WUAs are involved in non-construction activities as WUAs (i.e., beyond the traditional system of maintenance). Some attempts have been made to involve the WUAs in observing and discussing the results of the demonstration plots through farmer days. WUA involvement in input supply, credit, marketing and training is not visible.

Since watercourse improvement is undertaken formally with the WUA's participation, there is an appearance of farmer participation in the effort; while most farmers along the watercourse participate in providing labor and a portion of the materials cost, decision-making continues to take place in the traditional feudal manner.

Indications of this are: only the Chairman appears to know cost and work estimates of watercourse improvement; most farmers are not aware of their responsibilities under the WUA contract; and, accounts are not rendered in public meetings of the WUA. Farmers rarely knew the terms of the WUA contract, and often did not know that they would have to pay for a share of the materials used in watercourse renovation. The WUA contract was in English, and no translation was provided to the farmers.

The sub-project has organized a large program of demonstration plots. farmer days are held for farmers along a watercourse to observe and discuss the results of demonstrations. While the demonstration itself is usually on the land of a large farmer, farmer days are expected to provide the opportunity to all farmers to acquire information on improved technology. The sub-project has not conducted any impact assessments of farmer days to document how many farmers attend farmer days and whether that event influences their farming methods. The TA Team maintains that farmer days serve to promote the project's participatory objectives; there is no evidence yet in support of this claim, since not even farmer attendance - not to mention impact - has been recorded.

The recruitment of two sociologists (one WUADS and one Rural Sociologist) to work with the SMO offers an opportunity to undertake systematic organizational work with the WUAs prior to the beginning of construction on a watercourse. There are about 120 watercourses that have not been renovated so far and could be included in the CWM project with a better sense of community organization and the rules under which CWM can help the WUAs.

At the same time, the additional lining program opens up the opportunity to present additional lining as a reward for superior performance by a WUA on a pre-determined set of indicators. The TA Team's note on additional lining lists some useful indicators.

The Sind sub-project has identified wheat and cotton as priority crops for its demonstration plots program; these choices reflect the importance of cotton and wheat in the farming systems of the area.

For rabi 1987-88, the project organized 60 demonstration plots of wheat in collaboration with the Department of Agriculture. The Department provided the services of 20 Field Assistants. Rs 60,000 of project funds were also channelled to the Department through a PIL, and were used by the Department for the purchase of inputs used in the demonstration plots. The Department, however, did not have transport facilities and the budget to pay for the TA/DA of the Field Assistants, who are reported to have worked without these usual allowances. This year, 20 cotton demonstration plots have been planted with the assistance of the Department.

The TA Team's first Agronomist left in early-1987 and the present Agronomist was recruited in October 1987. Starting in late November 1987, the SMO and the TA Team have devoted considerable time to demonstration plots for wheat and cotton. The objective of this effort has been to demonstrate a package of improved inputs and practices to farmers. For wheat, the demonstration package consisted of: good levelling and seedbed preparation; sowing at the correct time; use of certified seed of the Pavan and Tando Jam 83 varieties (the latter for late sowing); 43.5 kg/acre of nitrogen, 23 kg/acre of phosphate, and 23 kg/acre of potash (delivered through urea, di-ammonium phosphate and sulfate of potash); cross-wise broadcast of seed for gap-free germination, and of fertilizer for uniform application; effective manual or chemical weed control; irrigation according to crop water requirements; harvesting the crop at the correct time, and proper storage. For cotton, the demonstration package included the Nayab, B557 and NT varieties. In evaluating yields, fields neighboring the demonstration plots were taken as control plots.

The results from cotton demonstrations have not yet been observed. For wheat, however, the demonstration plots showed a 35% yield advantage in grain over control plots (straw yields, important for small, livestock-oriented farmers, were not recorded). One report by the TA Team states that the technology demonstrated has a 4.5:1 ratio of incremental benefits and costs. Other TA Team calculations indicate that net returns to labor, land and managerial expertise can be increased by Rs 224 per acre as a result of the new technology, an increase of less than 7% over the assumed level of income on control plots. A third set of assumptions by the TAT leads to yet another result. It is not clear whether the technology that was demonstrated had any economic payoff for the farmer, and which critical input contributed the most to any yield increase: an elaborate new package was tested against a neighboring field with unknown variety and unrecorded levels of inputs and straw.

There is no design for follow-up monitoring to determine whether and in what form the recommended package is adopted in the coming season.

The extension methodology used by the Sind sub-project is that of promoting a comprehensive package of new technology consisting, simultaneously, of several elements. There is empirical evidence from Pakistan and elsewhere that farmers adopt innovations one at a time, in a sequence, rather than as a package; this has to do with the learning and capital costs of innovation adoption. The approach taken in the Sind sub-project puts an unrealistic burden on resource-poor farmers with little formal education and only sporadic contact with extension agents, for a technology whose benefits can be argued only with assumptions. The extension and statistical methodologies used in Sind fail to demonstrate any significant potential for technology transfer.

As is often the case with demonstration plots, the new technology has been demonstrated on land provided by large farmers, who can bear the risk of experimentation. Unless efforts are made to effectively communicate any positive findings to small farmers, the demonstration program may result in larger farmers gaining a significant lead in adopting innovations and this could lead to increased disparity. In other words, the demonstration plots program needs an innovative communications approach in order to reach the small farmers. The expectation that farmer days provide such an approach for small farmers needs to be examined with quantified follow-up data on patterns of technology adoption.

The Sind SMO and TA Team counterparts have made a promising beginning by: (a) identifying which crops to work with; (b) restricting their fertilizer recommendations to levels within the reach of the farmer; (c) involving extension staff in the demonstration plot program; and, (d) organizing a large number of plots all over the SPA. These efforts can have a much higher payoff than now if: (a) demonstration plots demonstrate only those one or two technologies that have a good chance of being adopted by farmers in the next season; (b) solid documentation is maintained for demonstration and control plots for both monitoring and eventual extension purposes; (c) any positive results are communicated by means of farmer days, audio-visual techniques and extension leaflets to the largest possible number of farmers; and, (d) supplies and services are organized around those technologies that have already captured the attention of most of the farmers.

In addition to wheat and cotton, fruit and vegetable in the SPA appear to have promising markets within reach of most farmers. Also, fodder production is important in affecting the work load and well-being of women. Thus, there would appear to be promising opportunities for improved varieties and good quality seed of vegetable and fodder in the short-term, and of fruit in the long-term. Women and small farmers could benefit greatly from improvements in vegetable and fodder productivity.

More generally, the SPA's farming systems could be analyzed quickly and comprehensively with the aid of literature review and a rapid appraisal exercise conducted jointly by agricultural and social scientists. Numerous agro-economics reports have been published by the joint PARC-CIMMYT research program. These include some pioneering work on the identification of farmer priorities in cotton-wheat areas, as well as analyses of other crops and technologies. A rapid appraisal exercise could be directed at broad sets of farming activity, such as cereals, vegetable, and livestock and fodder. One function of this exercise would be to identify specific opportunities for small farmers and women, who have not yet received specific attention from the project. While there may be opportunities for the project to improve the productivity of agricultural activities undertaken by women, these are not likely to be identified or addressed unless women professionals are involved in selected elements of the analysis of the farming systems.

The SMO may find it possible to experiment with farmer training in a small number of fields, such as livestock disease control, plant protection, and improved fodder (for women). This kind of training is a useful complement to extension efforts by government departments, provided WUAs can be persuaded to select and support appropriate farmers on a continuing basis. Men's training can be organized with the collaboration of the Extension Department at a central location in the SPA; women's training will need female staff that is mobile, since most women cannot be expected to come to a central location away from their villages.

An attempt was made to undertake precision land levelling (PLL) on a 4-5 acre plot offered by a large landlord. Cooperation was received from the OFWM Department, which provided staff and equipment. The SMO has also noted the accomplishment of precision land levelling on a large area of land (at least 1,300 acres). It

appears, however, that the larger effort involves good levelling but does not come up to the demanding technical requirements of precision levelling. The project has also announced (in a SCC meeting) that it has convinced GOS to give a subsidy of Rs 1,000 per acre for PLL. It is not noted in project documents whether or not this subsidy has been paid out, and, if so, to how many farmers.

PLL is an expensive procedure with an undetermined payoff for the farmer. At the same time, the delivery of subsidized PLL equipment and services is constrained by lack of staff training in the operation and maintenance of sophisticated equipment. While the GOS offer of a subsidy for PLL will induce more farmers to practice it, this is going to be an expensive program to replicate and sustain: a subsidy on the 6,800 acres targeted for the SPA would have a cost of Rs 6.8 million.

While good levelling may well have an economic payoff under existing technology and incentives, and many farmers may be practicing it, the payoff to precision levelling is questionable, particularly in view of its high cost. PLL entails not only the cost of machinery for precision levelling, but also, in some cases, the cost of late or no planting on land that is being levelled.

The TA Team Agronomist has identified improved levelling (as distinct from precision levelling) as an area for future demonstration. Given that some farmers are already paying attention to levelling, the challenge is to: (a) understand why some farmers find it beneficial to level their fields more carefully than others; (b) identify the larger set of farmers who might benefit similarly from improved levelling; and, (c) clearly demonstrate/communicate the benefits of improved levelling, while keeping control over the subsidy to PLL.

Improved water management: matching crop water requirements with available water.

The TA Team is working on a computer model with which to assist the farmers in using existing and enhanced water supplies more efficiently.

This model may well have an analytical role in understanding farmer choices, but its suitability as a source of farmer recommendations is questionable: what is optimal in a model may not be optimal for practicing farmers, since a model cannot be expected to replicate farmer objectives and resources with any great accuracy. Given the structure of household and market demand, and the farmer's considerable experience with water and other inputs currently being used, the farmer could be expected to respond adequately to changing levels of water availability; computer modelling, based on a partial understanding of the farmer's resources and priorities, is unlikely to improve upon the farmer's choices. While modelling can help illustrate the broad directions of farmer response to technological innovation, investing scarce project resources to devise farmer recommendations on the allocation of resources under a technology that is well-known to the farmers is probably a low-payoff activity for project management.

According to the project appraisal, the civil works program in the Sind SPA is expected to save enough water to make up for the average annual deficit between crop water requirements and available water supply. If this is correct, then project management would need to focus their efforts more narrowly on interventions such as those that: (a) help farmers overcome peak season water constraints; (b) exploit interactions between water and other water-sensitive inputs such as fertilizer, improved varieties, etc.; and, (c) identify water saving technology appropriate for the SPA and advise farmers on the use of this technology.

Current water management plans seem driven by the biological requirements of crops, rather than the economic and social concerns of farmers. There is no systematic documentation on farmer irrigation practices that the project is supposed to improve upon. Basic information collected through a rapid appraisal might yield insights into farmer priorities, knowledge and resources as they are reflected in cropping patterns, land preparation, variety choice, irrigation practice, labor allocation, seed rate, fertilizer application, etc. Such a diagnostic exercise might lead to the identification of profitable technological interventions for farmers to choose from, given the farmer's view of his markets and resources.

The preceding approach puts a premium on inter-disciplinary work within the TA Team and the SMO, and between the TA Team and the SMO. None of this seems to have been attempted so far in any systematic manner.

The SMO reports that it assisted several farmers obtain individual loans from banks. Mention was also made of one loan given in the name of the Chairman of a WUA for the benefit of members of the WUA.

Banks follow policies and procedures that are determined at a national level, either by their head offices or by the State Bank and the Pakistan Banking Council. A small project located in a remote area cannot be expected to change such policies. For instance, banks will lend only to credit-worthy individuals, not to groups of farmers. Similarly, zonal and local targets for agricultural loans are determined on an annual basis by the head offices of banks. Even if farmers get to learn the detailed procedures to be followed for loan applications, very few farmers will be able to get better access to a more-or-less fixed pool of subsidized credit. The project can, at best, assist a handful of credit-worthy individuals (usually large farmers) by playing an advocacy role with local branches of banks. It is highly questionable if such activities constitute a cost-effective and equitable deployment of CWM resources.

The dilemma for the SMO, the TA Team and A.I.D. project staff is that greater farmer access to credit is one of the important elements of project design, but one for which the national policy environment was not recognized as a constraint at the design stage. Thus, project staff in pursuit of a desirable objective have expended considerable time and effort discovering constraints that should have been obvious at the time of project design.

3.8 Special Activities

The 1987-88 work plan for the sub-project lists the objective of ensuring the availability of about 4,100 tonnes of good quality wheat seed and 570 tonnes of cotton seed from Sind Seed Corporation and SASO. The mechanisms for achieving this were not specific and remain unclear. In a similar vein, the work plan calls for:

- ensuring availability of 1.4 million bags of fertilizer from various depots and centers in the sub-project area;
- ensuring availability of sufficient stock of insecticides;
- precision land levelling of 1,300 acres;
- ensuring availability of Rs 33 million in credit for a range of agricultural needs;
- organizing 2 courses for field staff in water management with the help of the Water Management Training Institute (at Sakrand?); and,
- organizing 2 courses in water management and other agricultural practices for WUA members, "in collaboration with all agencies working for CWM."

In all instances, the mechanisms, and the required staff and financial inputs are not identified. Nor is it explained in any project documentation whether and how the targets were actually accomplished. There are, however, some indications in the minutes of the SCC meetings on how specific targets might have been attempted. For example: the representative of the Sind Seed Corporation promised in the 3rd SCC meeting in December 1986 that the Corporation would open a temporary depot in the SPA for the next growing season; it is not clear from project documents whether this was done, and to what effect.

The project, particularly through the SCCs, has attempted to convince input supply companies to give priority to the SPA in times of shortage. Representatives of various companies have also made promises to this effect in the SCC. But it is not documented whether and to what extent these promises have been carried out. Farmers interviewed along an unimproved watercourse (with no WUA) reported using different brands of

fertilizer, either supplied by the landlord, or purchased individually from a depot; all farmers reported using fertilizer, without the assistance of the project. Moreover, WAPDA's 1983 feasibility report for Sind [WAPDA, 1983b] reported fertilizer use of 32-36 kg/acre of nitrogen and 22-26 kg/acre of phosphate on wheat; this is very close to the levels recommended by the TA Team in 1987. Given the apparent adequacy of fertilizer supplies in the area, the SMO's role as an intermediary on behalf of farmers (at least with respect to fertilizer supplies) appears to have become redundant since it was first specified at the time of project design (when the fertilizer industry was highly regulated).

Some agricultural inputs are probably being supplied adequately by private sector dealers, commission agents and landlords; very often, the farmer can obtain inputs on credit from such sources. Thus, large numbers of farmers receive credit and inputs as a package from the same source. From the farmer's point of view, this arrangement could be improved upon if cheaper credit were available, or if inputs were available on time and in the required amounts. For reasons noted earlier, the project cannot obtain cheap credit for large numbers of farmers. At the same time, input supplying companies often cite national-level bottlenecks as the reason for shortage or delayed availability of inputs. The project can have only marginal impact on alleviating the shortage of inputs at the national level.

Although the sub-project's work plan lists farmer requirements of fertilizer, insecticide and certified seed, there is no evidence on how these requirements have been met with the assistance of the project.

The SMO and TA Team need to identify a very small number of critical inputs whose supply can be organized or influenced significantly by the SMO. There may be a high payoff to improved distribution of good seed. Part of the seed requirement may be met in collaboration with public sector agencies, while part of it may be generated within the SPA through a program of establishing seed farmers; the short-term objective should be good seed, not necessarily certified seed, that can be distributed throughout the SPA.

For fertilizer supply, the SMO could assist strategically-located WUAs obtain dealerships from various fertilizer companies; such dealerships are available at points along paved roads. Extreme caution needs to be exercised, however, that the dealer-WUAs do not turn into the personal businesses of their Chairmen, for that would be inconsistent with the project's participatory objectives and would merely channel project resources to a few influential individuals. WUAs should be selected for project support from among those that have a sizable and relatively homogeneous membership, and they should first explain how their members plan to share the costs and benefits of the enterprise.

Arrangements could also be made with the Agriculture Department to organize spray campaigns at critical periods for one or two selected crops. If the Department is willing, the project could organize farmer training in collaboration with the Department, and trained farmers (remunerated by WUAs) could assist Department staff during spray campaigns.

There are numerous other ways in which farmer groups in Pakistan have been assisted by irrigation and agricultural development projects. The project staff may find it valuable to establish a regular program of visits for concerned specialists to especially interesting projects

4. Institutional Development Issues

4.1 Monitoring and Evaluation

4.1.1 Organizational Arrangements

The Planning, Monitoring and Evaluation (PME) Unit of the Sind sub-project has a staff of eight, headed by a Deputy Director who is an agriculture graduate. This unit also includes: 4 graduate engineers, 1 diploma engineer, and 2 agricultural economists with masters degrees; 4 of the 6 senior staff members (Grades 17 and 18) joined in November or December 1987. The unit is organized into three 2-man teams, each with primary responsibility for extension activities, coordinated water course activities, and water management activities; the remaining senior staff member works in a coordination and liaison role.

The SMO's PME staff is assisted by the TA Team, particularly its FMS and WMS. This assistance appears to take the form of assignments drawn up for PME staff by the TA Team. Written assignments are reviewed and approved by the SPM. Upon completion, the records of assignments are maintained in an Assignment File, which is checked by the TA Team. Once approved, the records are transferred to permanent subject files and, occasionally, to computer.

4.1.2 Data Collection/Generation Issues

A baseline survey has been contracted out to the Sind Regional Plan Organization (SRPO). This work has been delayed due to lack of staff time and facilities at SRPO. It is now expected that a report will be provided by November 1988. The baseline exercise has four components: socio-economic survey, ground-water quality testing, soil testing and water flow measurement. The socio-economic survey has been completed and is being compiled by the SRPO. The soil analysis report is expected from the Agriculture University laboratory, which was sent the soil samples. Water flow measurement has not yet been initiated; it has been contracted out to an engineer at ZCL. Almost the same questionnaire was used in both Sind and Las Bela sub-project of Baluchistan.

The PME Unit has collected a significant quantity of data on the three coordinated watercourses. These data relate to: measurements of water discharge, seepage losses, etc.; land use in the two agricultural seasons; mapping of ownership and land use. In addition, data have been collected on demonstration plots, discharge on minors and bank credit for agriculture; an attempt was also made to record the performance of WUAs in cleaning watercourses.

Much of the effort that has been put into data collection appears to be incomplete and unsystematic, and suffers from quality problems. For example: measurements of discharge in a watercourse were taken on different days for different points along the same watercourse; no figures could be located for comparison of seepage losses before and after watercourse improvement on the same watercourse; farm-level data on land use along three watercourses collected in December 1987 have yet to be tabulated at an aggregate level; these data also suffer from internal inconsistencies; credit figures are simply approximate bank statements of the volume and kind of credit given in the region by two branches of a bank. Monitoring of WUA activities is, at best, anecdotal; there is no documentation of the process of organizing WUAs and having them participate in project activities. There is no monitoring and evaluation of the project's impact on women and different classes of rural society.

4.1.3 General M&E issues

The whole question of M&E needs to be thought through jointly by the SMO and the TA Team, with particular attention to:

- continuous monitoring and impact assessment along the lines of the End-of-Project status (EOPS) indicators listed in the A.I.D. Project Paper;**
- the documentation and analysis of project successes that can be extended to a larger portion of the SPA;**
- the documentation and analysis of project limitations and failures that imply the need for course corrections by project management;**
- appropriate methodologies for the preceding, including those methodologies that require close interaction in the field between SMO staff, TA Team and the villagers;**
- the kind of staff that is needed, either at the SMO or as short-term local consultants, for the preceding efforts;**

- the kind of support that could be provided by the TA Team, such as assistance with methodology, networking with national resource bases, identification of computer equipment and software, etc; and,
- the frequency and form with which M&E results need to be disseminated to the various clients - SMO, donors, villagers.

4.2 Sub-project Coordinating Committees

The SCC for the sub-project area includes the Chairmen of all WUAs, and representatives of line agencies, banks and public sector corporations. According to records made available to the Evaluation Team, three SCC meetings were held in Kandiaro between September 1985 and December 1986.

The 3rd SCC meeting was noteworthy for the presence of public and private sector officers who explained the procedures and programs of their companies, and promised to pay particular attention to the SPA in delivering inputs such as fertilizer, certified seed, pesticide, etc. The minutes of the other SCC meetings are dominated by discussions of civil works, such as requests for additional lining, additional assistance for labor payments, request for surveys or resurveys, etc.

One gets the impression from the minutes of the SCC meetings that farmers are openly voicing some of their problems and finding a responsive audience among public and private sector representatives. There is, however, an important omission that is apparent from the minutes. The dialogue that is reported in the minutes is best characterized as a dialogue between officers and petitioners: it is not a development dialogue in which farmers and project officers jointly explore ways and means for improved management of irrigation infrastructure and other farmer resources. For instance, there is no discussion about how WUAs are organizing the maintenance of watercourses after renovation. Nor is there any feedback from the villagers on the outcome of the project's efforts at obtaining credit, extension and supplies for farmers. There is no sense of the responsibilities that farmers may be willing to accept to improve the productivity of their resources: there are only petitions and demands for more services and subsidies. By all appearances, the SCC is conducted more as an official meeting than as a venue for articulating options for participatory development.

4.3 Inter-agency Coordination/Cooperation

There is a considerable ongoing investment of time and other resources for promoting inter-agency coordination and collaboration. While several examples of such coordination have been noted above, and more are planned, much of this activity begs the question: coordination to what end? It almost appears that coordination is being pursued as an end in itself, regardless of the value added. For example, the SCC involves a large number of officials and other representatives meeting regularly. The effectiveness of these meetings in addressing project objectives is, however, uncertain and undocumented. Similarly, the demonstration plots program entailed significant commitment of manpower from the Agriculture Department; the impact of these plots on farmer incomes is questionable and is not being examined adequately.

One general issue is of a better definition of the need for coordination in organizing marketing and the supply of inputs that are already accessible to farmers, or whose supply may be constrained by national policy that cannot be altered at the sub-project level. For example, there is indicative evidence that farmers may be using fertilizer in amounts that are recommended by the sub-project. If this is correct, the role for coordination with fertilizer marketing companies must be considered limited. In a similar vein, the example of the rapid spread of cucumber production shows the vitality of private enterprise in catering to the needs of small farmers. Similarly, it is reported that bank officers participate regularly in SCC meetings; the project design calls for improved access to credit. Yet, all scheduled banks, as well as the ADBP, have a policy of lending only to individual farmers rather than to farmer groups. Under these circumstances, the SCC becomes a means for securing cheap credit for credit-worthy (usually large) farmers, rather than for all or most of the members of the WUA.

Given the trend towards privatization in recent years, the SMO's coordinating role in the supply of inputs, credit and marketing services needs to be examined more closely. At present, the SMO is effective only in securing a share for some of the farmers of the sub-project area in rationed inputs and credit; this function is not replicable on a large scale. At the same time, the SMO may well have a facilitating role in the transfer of technology, but the mechanisms for this need to be spelled out clearly. Along similar lines, the role for WUAs in input supply and marketing needs to be re-examined; perhaps what the WUAs really need is the capacity to respond themselves to an ever-changing economic environment, rather than access to officials to secure dispensation.

5. General Issues

5.1 Productivity/Equity Issues

Civil Works, Agricultural Productivity, and Equity

Lining and other improvements have probably increased water availability in the Sind SPA (although this is yet to be documented). Farmer interviews suggest that the improvements in water availability have had the following effects: (a) an increase in cropping intensity, particularly in the kharif season; (b) an increase in rice cultivation, partly as a result of reduced kharif fallow, and partly as a substitute for cotton; (c) reduction in the silt deposited in watercourses (as a result of increased velocity), with a corresponding decrease in routine maintenance requirements; (d) deposition of nutrient-carrying silt in the fields, which could be beneficial if compensating changes in agricultural practices are made. The expected positive effect on crop yields is not yet observable with any reliability. Outlet remodelling, however, appears to have reduced water theft, thus contributing to reduced social tension.

The lining of watercourses has probably decreased the labor required of farmers for routine cleaning. It is expected that this lining will last for five or more years. If maintenance has not been satisfactory during this period, it is likely that deferred maintenance will require yet another program of rehabilitation.

5.2 Issues of Farmer Contributions

The whole issue of farmer contributions to watercourse renovation needs to be examined empirically in terms of its effect on the project's cost-recovery and participatory objectives. Since the issue is general, it is discussed in detail in the main report.

5.3 Consultancy Services

5.3.1 Civil Works Consultants

The civil works consultants devote inadequate time to supervisory work. It appears that the contracts for civil works consultants have budgeted too little time for there to be effective quality control at site. The SPM also feels that supervisory consultants should have a full-time presence in the SPA.

5.3.2 Technical Assistance Team

The TA Team appears to have the confidence of the SPM and others at the SMO. One reflection of this is that the SPM acts promptly on the advice of the TA Team, so that SMO and line agency staff can be contacted or directed to address problems identified by the TA Team.

The TA Team has had an ambivalent approach to defining the nature of support it can or should give to the SMO. By and large, it has insisted that its role is that of advisors to the SMO. According to the TA Team, this has two implications: that it should not be called upon to implement project activities; and that, where there

are no counterparts or adequate staff in the SMO, there is little for the TA Team to contribute. Since some of the SMO staff arrived after the TA Team did, and since the distinction between advice and implementation is often unclear, two kinds of practical issues arise out of the TA Team's definition of its functions.

First: since the TA Team arrived in April-May 1987, it has just over two years in which to help fulfil project objectives. Many of these objectives, particularly those that require institution-building at the government and village level, entail a long lead time at the design and experimentation stages. The practical issue, then, is whether and to what extent should the TA Team pursue project objectives in the short period available to it, regardless of the presence of suitable SMO staff. The TA Team's insistence on appropriate SMO staffing may well be soundly-based upon one interpretation of the TA contract. On another interpretation, however, the Team's approach could be a sign of its lack of commitment to project objectives: if government staff are not available on time, the TA Team's staff would not to be made available either.

The second practical issue concerns the ambivalent way in which the TA Team's approach is translated into assistance to SMO staff. While some TAT members give the impression of working to develop SMO staff capacity in order for the staff to actually do the work, others have taken a more objectives-oriented approach: some lead from behind and others lead from the front. Thus, some project components (e.g, demonstration plots) are spread far and wide with the active assistance of TAT members, while others (such as PME) proceed at a pace that is inadequate with respect to the project's current needs.

There is a need to harmonize the TA Team's approach with the requirements and realities of the project. Clearly, the TAT contract is one of these realities, but project objectives and the quality and number of staff at the SMO are additional realities that need to be accommodated if the project is to accomplish its goals.

The challenges faced by the Sind SPA are noted in detail in the preceding pages. While the tasks are complex, the SPM's confidence in the TA Team means that there are opportunities for the TA Team to provide leadership in defining the strategy for those program elements that are not yet articulated or operationalized. The TA Team has so far made a limited contribution to strategic planning; in the future, it has a substantial opportunity to do so in a shorter period of time.

Sehra-Naulakhi Background Statistics

Population (000) - 1981 Census	208
Number of Villages	95
Gross Area (000 acres)	165
Command Area (000 acres)	164
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	319
- public tubewells	200
- private tubewells	31
- Total	551
Crop Water Required (000 ac/ft annually) at Watercourse Head	650
Average Crop Yields, FY81, kg/ac:	
- kharif	
Rice	860
Cotton	420
Maize	380
Sugarcane	14,400
Fodder	6,580
- rabi	
Wheat	760
Fodder	17,460
Estimated Incremental Cropping Intensity (%):	
- present (P)	113
- future, without project (w)	114
- future, with project (W)	130
- increment W over w (%)	14
- increment W over P (%)	15
Projected Net Farm Income (000 Rs) Per Capita:	
- present	2.1
- future, without project	2.2
- future, with project	2.6
- increment with over without project (%)	18

Source: World Bank, Staff Appraisal Report: Pakistan. Command Water Management. April 1984.

APPENDIX 3-A

THE PUNJAB SUB-PROJECT MANAGEMENT OFFICE

In contrast to the other provinces, where there is one sub-project management office for each CWM sub-project site, in Punjab there is only one SMO to provide central administrative and coordinating functions for each of the four sub-project sites located in the province. Certain noteworthy aspects of that office and its activities therefore are presented here as an introduction to the evaluation team site visit reports to the Shahkot, Pakpattan, 6R/Hakra, and Niazbeg sub-project sites.

In authorizing establishment of the office, the Punjab provincial authorities are reported to have consciously decided to start small, and to add further staff only when the need was clearly demonstrated. Further, the SMO apparently was advised to emphasize the coordination functions of the office rather than to build implementation capacities, on the rationale that the SMO was only a temporary agency whose existence would not outlive the Command Water Management project. The mandate of SMO/Punjab therefore appears to be to stimulate and coordinate the CWM activities of others, rather than to itself undertake any activities other than those which are required of it by the project documents or which might not otherwise take place. There currently are reported to be no official expectations of SMO sustainability following the end of CWM in the Punjab.

1. The SMO/Punjab Organizational Structure

The SMO/Punjab is a comparatively small operation, comprising the units mandated by the project documents and staffed by a fairly lean complement of only 11 persons, as follows:

- The office of the sub-project manager consists only of the SPM plus 10 other technical persons. The SPM/Punjab is himself on deputation to CWM Project from the OFWM Project, and the SMO office is located in the OFWM/Punjab office complex. The SPM considers the SMO to be understaffed given its diverse responsibilities and geographical spread, but claims that it receives good support from the cooperating agencies, in part because of the strong commitment to project concepts which the project receives, especially from the Punjab Secretary of Agriculture and the Provincial P&D unit.
- The water management unit's mandate is to identify the elements required to develop alternate pilot water management plans and to collect data necessary to prepare such plans. It is also expected to consult with all with line agencies, the TAT, and the farmers in the identification and development of acceptable plans. The plans are to be implemented on an experimental basis at various locations throughout the province and a determination then made of those plans that have most promise of being replicated over a wide area.

The water management unit has a chief, the Deputy Director for Irrigation, but including that person has only two visible part time workers to carry out all of activities required to develop a water management plan. Additionally, there are four sub-engineers, one for each sub-project. One of the two staff members not assigned to a sub-project also serves as the SMO's computer expert and a large portion of his time is devoted in training SMO personnel in the use of micro-computers. One staff member has a Master's Degree in water resources from the Asian Institute of Technology and appeared to be quite competent to carry out the activities of this unit. These two persons are said to have made the work of the TAT's Water Management Specialist possible. Nevertheless the staff is only available on a part-time basis, and is not adequate to develop alternative pilot water management plans for each of the four subjects, all of which have different physical conditions.

- The monitoring and evaluation unit, as in other SMOs, has the mandate to collect data pertaining to the project area before the implementation of the project to establish the pre-intervention conditions and then to collect data continuously during implementation. The data is to be analyzed to help determine the project's direction: successful activities can be continued and unsuccessful ones discarded. The monitoring and evaluation unit has a chief and three Assistant Directors/Liaison, to handle the M and E requirements of each of the sub-project sites except Niazbeg, and appears to be a functioning

unit. The TA Farm Management Specialist has been quite active working with this unit collecting data indicating conditions on the watercourses prior to the project interventions. This data collection has been actively supported by the members of the WMU particularly in the area of flow data, which is a task assigned to them.

1.1 Relations with Other Agencies

The activities of the following agencies are coordinated by the Project Manager. The staff detailed is for the four sub-projects of Punjab.

(a) CWM Project Circle, PID	
-	Superintending Engineer - 1
-	Executive Engineer - 3
-	Sub-Divisional Engineers - 8
-	Sub-Engineers
-	Office Support Staff
	<u>54</u>
(b) Extension Services	
-	Director H/Q (Part-time) - 1
-	Dy Dir District Level (Part-time) - 5
-	Extra A. Dir. Tehsil Level (Part-time) - 7
-	Agric. Officer Markaz (Part or full-time) - 10
-	Each Markaz 12 to 15 villages
-	Field Assistant Union Council - 50
-	Each Union Council has 4 to 5 villages
(c) On Farm Water Management (OFWM)	
-	Director (Part-time) - 1
-	Project Director - 1
-	Assistant Engineer - 4
-	WM Specialists - 8
-	WM Officers - 32
-	Sub-Engineers
	<u>46</u>
(d) Civil Works Supervisory Consultants	
(i)	NESPAK-NDC part-time staff
(ii)	ACE-ZCL part-time staff

1.2 Liaison with Sub-projects

The SMO exercises its responsibilities in the sub-project areas largely through sub-project offices, each headed by a liaison officer and supported by small SMO staff. These officers coordinate the activities of personnel who are made available from concerned line agencies, and their operations are described more fully in the separate sub-project site visit reports.

- Attempts have been made over the past couple of years to staff each sub-project liaison office with a Water Users Association Development Specialist (WUADS). For a variety of reasons (e.g. lack of authorization in PC-1s, recruitment difficulties, concerns over whether or not such a person should be provided directly by and in the employ of USAID, etc.), this has proven difficult, and these positions were being filled only at the time of the evaluation team visit. The provincial government apparently is being consistent in its institutional development philosophy by now holding that since CWM is an experimental donor-funded project, these experimental WUADS positions should also be donor funded until such time as they have demonstrated their value sufficiently that they could be incorporated into provincial budgets.

2. An Institutional Development Model

To the extent that the SMO/Punjab approach presents special challenges, these appear to concentrate mainly in the area of overstressing a limited staff, thus preventing adequate focus on selected priority functional or sub-project areas. Conversely, it provides the opportunity for greater initiatives by the SMO to encourage experimentation because of the variety of project conditions which fall within its purview. It also, by necessity, requires full reliance on the cooperating agencies, and therefore may place a special responsibility on SMO personnel to assist in assuring that these agencies develop their own capacities to comply with CWM needs and requirements. It is a demanding situation but the SMO Punjab appears to be coping with it.

Thus, while the approach promotes cost-efficiency through the comparatively small size of the SMO, it cannot yet be determined if it also can assure cost-effectiveness in terms of its results in achieving CWM project objectives. This approach therefore constitutes an interesting institutional development model which differs in several significant ways from the one being followed elsewhere, and in particular in Sind province, where the SMO gives a greater appearance of anticipated permanency. Each model may be equally valid in its local circumstances, and this apparent divergence therefore constitutes an example of the kinds of experimentation which CWM was designed to encourage. The evolution of these different models should be followed with interest by those charged with oversight of the institutional development aspects of the project.

3. General Issues Relating to the SMO/Punjab

3.1 Sub-project Coordinating Committees

It was indicated to the evaluation team that SCCs had not originally been looked upon favorably in the Punjab due to their perceived potential of becoming unnecessarily political. Nonetheless, they were activated in accordance with CWM project requirements, and indications from the various sub-project sites suggests that they demonstrated the potential of contributing to the achievement of project objectives without assuming any political hue. Nonetheless, it appears that SMO interest in promoting this concept is beginning to wane in the Punjab, reportedly in part because SCC meetings proved to be unsettling due to their tendency to raise farmers' concerns which could not be resolved within existing government programs or capacities. It would be desirable for SCC meetings to be reactivated and even expanded to the fullest possible extent, as this move would help legitimize the concept of farmer involvement in development activities at the same time that it would help identify those areas of concern where program initiatives should be concentrated.

3.2 Inter-agency Relationships

As indicated, the SMO/Punjab must rely on good institutional relationships with other line agencies in order to fulfill its mandate. The impression received by the evaluation team was that this is being accomplished, in part because of the strong support the project receives from senior provincial authorities. The SMO maintains offices within the OFWM office complex, and relationships there appear close and cordial. Similarly, CWM is strongly supported by the Provincial Secretary of Agriculture, P&N personnel, and other senior officials, and this support is communicated to the line agencies in ways which promote close support and cooperation. One possible partial exception to this might concern the PID which, although it is supportive at senior levels and actively implements its civil works components, reportedly continues to be only passively interested at operational levels in the broader project objectives or the activities of the SMO.

3.3 Technical Assistance Team Relationships

There is one important area where the necessary good working relationships do not exist. This involves the SPM and most of his staff and the TA team and in particular that team's chief of party and its extension specialist. Relationships between the SMO and the TAT have deteriorated to the point that the common pursuit of project objectives is nearly impossible, except in specific instances where individual staff members on each side have developed mutual respect and common work programs. The reasons for this breakdown are many and are complex, and would best be addressed in some venue other than this report. The important point here is that this situation should not, and can not, be allowed to continue, as no one stands to gain by it. Recommendations concerning this matter will be included in the evaluation team's report. One common theme within these recommendations revolves around the observation that the most effective and best appreciated technical assistance efforts usually occur when technical assistance:

- makes special and concerted efforts to establish collaborative and mutually respectful relationships among those with whom it works;
- accepts the environment within which it must work as a challenge for positive technical assistance interventions, rather than as an excuse for less than optimal effectiveness;
- retains the flexibility required to respond to unanticipated problems and opportunities; and
- serves as a partner to indigenous project personnel, and therefore often acts as their advocates to the donor community rather than as the donor's agent among them.

The evaluation team's further observation is that the TAT has not yet established the kind of relationship to the project which might enable it to function in ways which might be of optimal benefit in pursuit of project objectives.

3.4 Relations with USAID

A related, but separate, issue concerns an unresolved issue between USAID and Punjab project authorities regarding the requested reimbursements for lining work completed within the spirit (and budget) of the project in the sub-project areas, but outside of the authorized limits set by USAID's contract documents, the Project Implementation Letters (PILs), and other regulations. Without wishing to be drawn too deeply into this debate, the evaluation team feels compelled to observe that this outstanding issue needs to be resolved at the earliest possible moment. It is currently focussing the attention of key personnel on both sides in ways which detract from their capacity to appropriately deal with the project's more fundamental institutional and other non-civil works development needs. Moreover, it is damaging relationships between USAID and Punjab provincial authorities which are detrimental to CWM's long-term interests. This is inappropriate now, and will become more so if the conclusions and recommendations of the evaluation team's report are to be seriously considered and incorporated into future project work.

While acknowledging the complexities of this issue, the evaluation team would like to suggest that it might prove to be in everyone's interest for USAID to explore the range of options available to it to signal that it is not unduly bound by bureaucratic regimentation. The team does not disagree with USAID's current position that prior agreements should be observed, especially when they are supported by written documentation, and that project authorities in the Punjab should not have proceeded with additional lining in contravention of those agreements. Concurrently, however, it would appear that the additional linings were approved by Provincial authorities and undertaken within the spirit and intentions of the CWM documents, which explicitly encourage flexibility in experimentation in order to optimize the potential for achieving project objectives. Moreover, there is no reported evidence of misallocation or misuse of funds which are unique to this particular situation, and the additional work was undertaken without exceeding budget allotments. The problem really resolves around the issue of who has what authority for permitting flexibility in project implementation.

Under these circumstances, the evaluation team suggests that it would best serve the long-term interests of the CWM project for USAID to seek a resolution of the dispute which did not take refuge in legalistic interpretations of contract requirements, but instead communicated a desire to reestablish the kind of collaborative relationship which would promote innovation and experimentation in determining viable new ways to promote project objectives. Needless to say, such a decision should not set precedents which would compromise USAID's ability to effectively involve itself in the management of development projects which it is supporting. The evaluation team has seen no evidence which would suggest that this would be impossible within the context of as liberal a resolution of the current problem as inescapable A.I.D. regulations permit.

APPENDIX 3-B

SHAHKOT SUB-PROJECT SITE VISIT (PUNJAB PROVINCE)

1. Circumstances of Visit

The entire evaluation team travelled to Sub-project Shahkot on Saturday, August 27, 1988. The team was joined by Mr. Saleem Arsjad, the Project Manager of the SMO; Mr. Gill, Director, OFWM; Mr. Chaudry, PID Project Manager for IDA Projects in the Punjab; Mr. Rashid, XEN, PID, Punjab, the Chief Engineer, Planning; Mr. Hayat, Punjab, PID; Mr. Arif, Assist Engineer, Water Management Unit, SMO; Mr. Elhai, Computer Specialist, Water Management Unit, SMO; and Mr. Usaf Ali, Assistant Director, Water Management Unit, SMO.

2. Background

The subproject is situated in Tehsil Sheikhpura of District Sheikhpura and Tehsil Jaranwala of District Faisalabad. The cultivable command area is 48,774 acres.

This sub-project is underlain with relatively sweet groundwater but suffers from drainage problems. To alleviate the drainage problems, both subsurface and surface drainage facilities were proposed. The surface drainage system consists of drainage channels and the subsurface drainage system will consist of 36 tubewells located at the lower end of the project area. The percentage of the length of watercourses which was proposed for lining was 20 percent. The was a value that fell somewhat above the lowest value selected for very sweetwater zones indicating that the drainage problems are not too severe.

2.1 Sub-project Description

The civil works proposed for Shahkot Sub-project consisted of lining of canal minors and watercourses, remodelling of outlets, construction of drainage works and precision land levelling. Formation of Water User Groups, WUAs, was proposed to construct the watercourse lining, to maintain these watercourses after they were constructed and to make use of the improved water supplies which would result from the lining and the non-water inputs that were to derived from the project. Demonstration plots were to be used to demonstrate the value of improved farming practice, land levelling, and the use of non- water inputs.

3. Project Activities

3.1 Sub-project Management Office

The Shahkot Sub-project is about two hours by road from Lahore so the SMO activities are mainly run from Lahore. One liaison officer was in residence at the sub-project site. His duties were to coordinate project activities at the site, carry out administrative duties and as part of the M & E Unit assist in data collection. The WMU staff of the SMO with the assistance of the TA Engineer had recently installed a weather station at the site of the sub-project. The SMO also has technical staff living at the site assigned to carry out daily measurements at the weather station.

Due to the relatively close proximity to Lahore and since some SMO staff are easily accesible, this project gets good attention from the SMO office. The evidence was the special signboard provided at the tail of the minor from which the coordinated watercourse leads. This sign board is used to record the daily flow measurements of the quantity of water actually received. Values that the PID is suppose to deliver are also indicated. In this way the farmers of the WUA can have an accurate indication as to whether they are receiving their proper discharges. This also is the only sub-project for which a weather station has been installed. Equipment has been ordered for the other sub-projects.

3.2 Civil Works

3.2.1 Sub-project Goals

The goals were to reduce water seepage through lining of minors and watercourses. Since this sub-project had drainage problems a combination of surface drains and subsurface drainage via tubewells was proposed. The tubewells were located in a sweetwater zone at the lower end of the project where groundwater levels were the highest. Twenty percent of the length of the watercourse length was proposed for lining since the drainage problem was not terribly severe. In comparison at 6R Hakara Sub-project where the drainage problems are more severe, a percentage of forty was proposed.

3.2.2 Sub-project Activities

The proposed targets and the actual progress for the civil works construction is presented in the following table. The progress indicated is up to June, 1988.

Civil Works Progress - Shahkot

<u>Description</u>	<u>SAR Target</u>	<u>Scheme Cleared</u>	<u>Actual</u>
Canal Rehab, miles	23.46	23.46	23.46
Canal Lining, miles	10.00	10.23	10.23
Remodel Outlets, nos.	95	90	90
Surface Drainage, acres	12,000	12,000	2,500
Tubewells, nos.	36	0	0
Water Course Lining, nos.	75	53	53
PLL, acres	6,400	6,400	4,850

The progress of lining of minors and water courses is adequate, but tubewell construction to achieve subsurface drainage has not commenced, and little surface drainage works have been completed. One surface drain was inspected during the site visit. The drain had been completed in the reach inspected, though it was quite full of water. The water could not flow through, because the drain had not been excavated continuously. The outfall control structure construction was inspected. The progress and quality of construction here were adequate. A preexisting outfall drain was observed. This outfall will receive discharge collected in the newly constructed system.

3.2.3 Quality of Civil Works

The quality of construction of the lining of minors and water courses observed was adequate. The excavation of drainage canals was going slowly and no completed drainage canal section was noted. Construction supervision was not adequate to insure that the construction conforms to minimal acceptable standards.

The civil works consultant, ACE, is only required to inspect a watercourse twice during construction. The USAID engineer selectively inspects approximately ten percent of the watercourses once after completion to assure adequacy of construction. Construction inspection is not thorough enough to determine if the works are constructed strictly to the contract specifications, because no fulltime inspectors are assigned to the works. There is a full time PID man assigned to construction supervision.

3.3 Non-civil works

3.3.1 Sub-project Goals

In the non-civil works portion of the project the goal is to organize farmers to make use of increased water supplies resulting from the civil works by implementing improved water management practices and by utilizing non-water inputs to increase agricultural production and incomes to farmers.

For this sub-project, PLL, scheduling of water, water rotation, and determination of the optimum number of irrigation water deliveries will be stressed since farmers showed a reluctance to change the crops presently being grown.

3.3.2 Sub-project Activities

The registration of 75 WUAs was proposed in the Shahkot Sub-project area. The SMO reports that to date 77 WUAs have been formed. A total of 148 demonstration plots were proposed. The SMO reports that 307 demonstration plots have been carried out.

Discussions were held with two groups of farmers from the WUAs on the CWC. Following are some of the points learned from those discussions:

- At the CWC, 1R of the Shahkot Distributary, a sign board had been installed by the WMU of the SMO so that villagers could record the actual discharge that they were receiving at the tail of the minor. The discharge that the PID claimed to be delivering was also shown. The information recorded here could help the farmer to adapt his crops and their crops water requirements to water supplies available;
- Farmers were asked why they did not shift to crops that require less water. They stated that they understood that crops such as cotton and oil seed required less water but that they required subsistence crops such as wheat and were not in a position to shift to these cash crops;
- Twenty percent of the watercourse length was being lined for this sub-project. Two demonstration plots had been undertaken, one at the tail and one at the head of the of the watercourse where discussions were held. Some PLL had been carried out and furrows and borders tried. Overall, the SMO reported carrying out more than 300 demonstration plots. Only 75 watercourses are targeted for lining, indicating four demonstration plots for each watercourse. This was a more intense use of demonstration plots than noted in other sub-projects;
- The WUA with which discussions were held had 84 members. A cooperative had been formed and credit of Rs. 60,0000 had been received. Forty members had made use of this credit to purchase non-water inputs. The credit was obtained from a cooperative bank. The loan was interest free. This year it is reported that interest free loans have been discontinued; and
- It was reported that some farm implements had been made available to the WUA.

3.4 Productivity/Equity

The farmers stated that as a result of the lining of watercourses and minors, more land was being irrigated and that less theft of water occurred. It was reported as stated above that there were 84 members of the WUA on the CWC. This large number indicated that the benefits were being shared by large numbers of persons. It was reported that credit had been made available to 40 persons. This was equitable since the credit had not been made available to just a few persons. Less water theft and arrival of a greater quantity of water at the tail indicated that the project had resulted in a more equitable distribution of water.

3.5 Improved Water Management

No improvements in water management were noted in the field. Water available had been increased due the lining works and it appeared that supply was more reliable. As noted in other writeups and trip reports, a specific simple water management plan should be developed for each sub-project and tested on a pilot basis. The Irrigation Department Chief Engineer for Planning accompanied our team on the field visit to Shakkot, and the problems of improved water management were discussed with him. He had received a proposal on this subject from the TA Team that proposed matching up deliveries with the actual crop requirements. He was sympathetic to this proposal, but stated that improved water management in matching up crop water requirements with water available seemed only possible at the watercourse or minor level where the farmers could make their own decisions.

The steps that could be considered were the use of alternative crops, changes in water scheduling, using a different number of water applications, use of an optimum amounts of water as determined by the crop water requirements of the actual crops being grown, and the actual weather conditions prevailing during the growing season. A new weather station had been installed at this sub-project. The station included equipment which recorded continuous rainfall values, temperature, wind velocity and humidity.

The same question of matching supplies to crop water requirements was posed to the Secretary PID when the evaluation team meet with him. He stated that PID would study such a proposal and stated at the minor or below this level chages could be entertained.

4. Institutional Development Issues

4.1 Monitoring and Evaluation

The TA Farm Extension Specialist has been collecting data pertaining to conditions prior to implementation of the project for many watercourses located at this sub-project. Under the guidance of the TA Water Management Specialist, many water measurements of flow after renouation are being taken. Later analyses will be able to compare before project and after project conditions.

4.2 Water Management

Data on existing crop water requirements is being collected and flow measurement in the system are being taken. A new weather station has been installed. There is a good chance on this sub-project that pilot alternative simple water management plan could be tired because all the necessary data has been collected. Plans must be quickly developed so they can be tested during the next crop season.

4.3 Sub-project Coordinating Committees

Meetings have been held but farmers reported that SMO and OFWM do not live up to their promises. Meetings were last held in during the first quarter of 1988.

4.4 Provincial Coordinating Committees

It has been reported that the last PCC meeting was held in May this year.

5. General Issues

5.1 TA Team

There was good evidence that the Water Management and Farm Management Specialists were carrying out data collection and investigations that could lead to a water management' in this sub-project. Crop water requirements have been collected and a weather station constructed.

With the information recorded at the weather station, adjustment can be made in the crop water requirements based on prevailing rainfall and temperature during a given growing season. This type of information would be very valuable in implementing a water management plan. When the new crop water requirements are known the irrigation supplies could be adjusted to reflect the needs. This is a prime example of how water could be saved. The challenge of the plan will be to conceive of a method, at least at the watercourse level, of adjusting the supplies.

5.2 Recommendations

Conditions for testing a pilot water management plan are good for this sub-project since the weather station has been constructed and the project is close to Lahore where access is easy and cooperation from the PID is good. Many of the elements required to develop the plan have been assembled, studied and investigated. Now is time to get concurrence from the WMU, OFWM, SPM, TAT and the farmers and implement some simple alternative water management plans before the next cropping season gets away.

Shahkot Background Statistics

Population (000) - 1981 Census	96
Number of Villages	36
Gross Area (000 acres)	63
Command Area (000 acres)	49
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	80
- public tubewells	25
- private tubewells	-
Total	105
Crop Water Required (000 ac/ft annually) at Watercourse Head	202
Average Crop Yields, FY81, kg/ac:	
- kharif Rice	800
Cotton	120
Sugarcane	14,960
Fodder	6,680
- rabi Wheat	970
Fodder	22,870
Estimated Incremental Cropping Intensity (%):	
- present (p)	143
- future, without project (w)	142
- future, with project (W)	158
- increment W over w (%)	11
- increment W over P (%)	10
Projected Net Farm Income (000 Rs) Per Capita:	
- present	1.7
- future, without project	1.7
- future, with project	2.1
- increment with over without project (%)	24

Source: World Bank, Staff Appraisal Report: Pakistan Command Water Management, April 1984

APPENDIX 3-C

PAKPATTAN SUB-PROJECT SITE VISIT (PUNJAB PROVINCE)

1. Circumstances of Team Visit

The visit to Pakpatten sub-project area was made on 29 August 1988. Evaluation Team members were Russell Betts, M. I. Chishti, and Peter Reiss.

The team was accompanied by SMO and line agency staff: Saleem Arshad (SPM), Mushtaq Gill (OFWM Director), Anwar-ul-Haq (Liaison Officer), Alla Ditta (Water Management Specialist), Nisar Ahmed (WUADS), and representatives of supervisory consultants.

The visit began with an orientation at the Vehari PID guest house, where SMO staff have offices and reside. The team visited two watercourses where the team had extended conversations with farmers: 1L watercourse on 6-R distributary, where chairmen or executive committee members of five WUAs had assembled, and the coordinated watercourse. Subsequent discussion with SMO and TAT personnel in Lahore provided additional information.

2. Background

2.1 Physical Setting

Pakpatten, with a cultivable command of 97,000 acres, is the third largest of the sub-project areas. The sub-project area lies within the Vehari and Burewal tehsils of Vehari District, contains 80 villages, and has a population of 144,000. Pakpatten, at the right tail portion of the main Pakpatten Canal, is supplied with surface water by five distributaries. Their total discharge is 410 cusecs. The length of the distributaries and minors is 98 miles. There are 212 watercourses in the sub-project area. The system is roughly seventy-five years old.

Pakpatten was chosen as one of the four Punjab sub-project areas as a contrast. It has neither seepage nor drainage problems. It is said to be very fertile. Eighty-five percent of the area is fit for groundwater exploitation; there is no waterlogging. It has never been a SCARP tubewell area. Pakpatten is also characterized by private tubewell development. In the past three years, the number of tubewells has risen from 215 to 515. Of four major field crops (rice, cotton, wheat, and sugar cane) the SAR indicates that Pakpatten yields exceed the national average for only rice and wheat.

2.2 Socio-economic Circumstances

The farmers in the Pakpatten command are primarily small landowners. Holding sizes are often less than required for subsistence farming. Small holdings of several family members may be worked as a single unit by a family member. A consequence is that although there may be many formal members of a WUA, the actual number of farmers exploiting the land is far fewer. Formal organizations existing in the villages include a zakat committee and the union council (which includes twelve villages). Pakpatten is also described by staff of the SMO as having had a higher incidence of cooperative societies than any other Punjab sub-project area. Most of these societies have lapsed since they were formed more than a decade ago. The small nature of the land holdings may have both stimulated farmer interest in cooperatives and made their viability untenable.

2.3 Pre-CWM GOP Efforts

Pakpatten was included in one of the five Punjab pilot agricultural extension program sites for Training and Visits in 1981. That same year, OFWM, funded by the World Bank, introduced the watercourse improvement program into Pakpatten. By the time CWM began in 1986, OFWM had lined 35 watercourses. As a general policy,

OFWM lined 30 percent of the watercourses in areas with saline groundwater. On an additional six watercourses, lining was begun and later stopped at the insistence of the water users. OFWM cited a lack of cooperation, including refusal to contribute, pay for labor, or repay for materials. OFWM officers call them laggards. Others in the area suggested that in some cases key individuals, often at the heads of watercourse, were attempting to dominate circumstances for selfish purposes. In some cases, shareholders took OFWM to court for a stop order. In others, the official agencies have felt need for legal recourse or other means in order to properly respond to the perceived felt needs of the majority.

3. Sub-project Activities

3.1 Sub-project Management Office

Since the SMO is based in Lahore, where the SPM sits, it has established a separate coordinating office in Pakpattan, staffed with a Liaison Officer, Sub-Engineer, two helpers, a radio operator, and, most recently, a WUA Development Specialist.

The SMO appears to be fully staffed at present. The recruitment of a WUADS to the office was long delayed, apparently due to the reluctance of the SPM to hire WUADS for any of the sub-project areas. Concerns included the usefulness of the position, funding source, and GOP sanctioning.

The SMO appears to have a stable staff. There is no evidence of the frequent personnel changes found in some other sub-project areas.

3.2 Other Relevant Agencies

Other government officers participating in CWM activities include a Water Management Specialist from OFWM, a Sub-Division Engineer from the PID, and an Extra Assistant Director of Agriculture (EADA) (one-third time) and a Field Assistant from Agricultural Extension. All but the EADA are full-time on CWM. OFWM supplies one field team to the sub-project area, which includes the Water Management Specialist, two Water Management Officers, Sub-Engineers, and one Clerk. SMO, PID, OFWM, and Agricultural Extension staff sit in different offices. Staff cite inadequate space in the SMO as being the prime reason for the physical isolation of CWM related personnel according to line agency. OFWM staff speak of improved coordination with the PID for data collection and outlet closing.

3.3 Sub-Project Coordinating Committees

Until roughly six months ago, SCC meetings were regularly held in the command. The SPM divided the area into head, middle, and tail portions and rotated monthly meetings among the three. Although SMO staff indicate that the level of water user participation was good, the net effect was to restrict contact with representatives of line agencies and non-government bodies to once a quarter, rather than once a month. The meetings are described as volatile, but they also served as a forum for presenting petitions by the water users for problem resolution by the SMO.

According to farmers in the area, WUAs met among themselves prior to SCC meetings, and often solved some of their common problems (cleaning of courses and personal matters). This was something which did not happen before CWMM among watercourse sharers. The WUAs reportedly took to SCC only those matters which they had been unable to solve among themselves or which required government inputs.

3.4 Civil Works

Sub-project Targets and Achievements

<u>Activity</u>	<u>SAR</u>	<u>Target</u>	<u>Achieved</u>
Canal lining (mi.)	38.7	29.7	36.9
Canal rehabilitation (mi.)	55.0	42.7	45.10
Outlet remodelling (no.)	203	152	135
Watercourse improvements (no.)	162	122	132
Buffalo wallows	-	-	9

These figures represent targets through FY88 and progress through 30 June 1988. Surface drainage, sub-surface drainage, and channel disposal are not required in Pakpatten and are not part of the program. An additional two watercourses were lined since that date, leaving thirty within the uncompleted target group.

The quality of the civil works is satisfactory. There are no apparent shortcomings.

3.4.1 "Uncooperative Water Users"

Thirty watercourses remain to be lined according to the target, but it is the intention of the SMO and OFWM to improve every watercourse in the sub-project area. Fifteen watercourses, outside the targets, will be lined using remaining funds. This plan introduces a problem of how the staff will gain the cooperation of shareholders who have already contested the improvements. Characterizing them as laggards establishes an unproductive adversarial relationship from the outset.

3.4.2 "Percentages of Lining" and "Critical Areas" Issues

The SAR suggested a 15 percent limit for watercourse lining in Pakpatten. USAID accepted that recommendation and has made it a basis for reimbursements. CWM frequently exceeded that limit in Pakpatten. During the first year of the lining program under CWM, 41 watercourse were improved. Of these, 10 or 12 were lined to a maximum of 50 percent, averaging roughly one quarter of the run. Water users were charged a 50 percent recovery fee, after discussion with and agreement by them. Additional lining was not provided in succeeding years, but the issue remains. The SMO has stated that a single limit for Pakpatten does not recognize variation within the command, which has some saline areas. It has requested flexibility in the percentage of lining applied to any watercourse, using an average for all four Punjab sub-project areas. USAID has not yet responded definitively. The Gop has complained that USAID is being inflexible and contradicting the "experimental" nature of the project by "punishing innovation."

Watercourses are invariably lined from the outlet without regard for "critical areas." No monitoring has been done on the effectiveness of this approach, but there is no indication that farmers would accept an alternate approach.

3.5 Non-civil Works

Non-civil works programs are dominated by the requirements of the civil works targets. WUAs are formed quickly on paper in order to initiate physical construction.

Sub-project Targets and Achievements

<u>Activity</u>	<u>SAR</u>	<u>Target</u>	<u>Achieved</u>
WUA formation (no.)	162	122	169
Precision land levelling (acres)	6400	2560	4850
Demonstration plots (no.)	349	122	96

These figures represent targets through FY88 and progress as of 30 June 1988.

3.5.1 WUA Formation

Judged superficially, on the basis of number of WUAs formed for watercourse improvement, CWM has exceeded the targets in the sub-project area. However, success with WUAs must be determined by criteria other than mere number of associations registered, which is how OFWM ordinarily measures success. There have also been project attempts to secure cooperative and commercial bank credit for farmers.

A coordinated minor program was instituted in the sub-project area as a step towards the formation of a WUA federation. A task force committee was formed, which included the Liaison Officer, EADA, Water Management Specialist, SDO, representatives of the cooperative bank and seed companies, and six members of WUAs. The task force met three times with no substantive accomplishments, but CWM has created a forum for direct talks among farmers and the public and private sectors.

In Pakpattan, the method of working with WUAs on watercourse improvement has followed the OFWM procedure of registration, survey, design, and construction, in quick succession. The project is meeting watercourse improvement targets, but this approach has yet to provide an opportunity for real farmer participation. Nor has the SMO developed a training program for skills transfer to water users which would allow them to play a supervisory role.

Although there have been efforts to strengthen WUAs through credit and the creation of a federation, there has been no attempt to monitor or document these activities.

The SMO has not yet accepted the participatory approach in its program of WUA formation and strengthening. Until farmers are permitted to play a decision-making role in watercourse construction and follow-up activities, attempts to strengthen WUAs are unlikely to succeed. The TAT and WUADS will need to make a series of presentations to the SMO and OFWM concerning the promise of this program.

Plans for strengthening WUAs are a haphazard mix of discrete elements which do not add up to a program. Working closely with the SMO, the TAT must develop a comprehensive program with realistic targets for WUA involvement which leverages project resources and brings water users into project activities in a more active role.

The recruitment of a WUA Development Specialist provides an opportunity for innovative work in the sub-project area. He is the first such specialist hired in the Punjab. However, his first assignment is to organize a WUA federation on a distributary with twenty watercourses. This work is, at best, premature. The WUADS would better spend his time becoming acquainted with the participatory approach, acquainting the SMO and OFWM with it, and introducing with it on a trial basis.

3.5.2 Extension Services

Demonstration plots have been the primary method used by the project to introduce new technologies. After watercourse lining, the standard package is offered as a one-time intervention on a few acres. The results of demonstrations of wheat of the land of 13 farmers in six villages in winter 1987 indicate increased yields of from 15 to 39 percent. The primary change introduced is a change in the date of sowing. A change in sowing date

might be made a general recommendation, provided there are no constraints for farmers in planting early. Some special demonstrations have also been introduced with inputs secured from private fertilizer firms.

The focal point for CWM post-improvement is the coordinated watercourse. Designed by the TAT, the CWC program includes concrete outlets for all farm ditches; precision land levelling; and extension services, including a crop survey, discussions concerning maintenance requirements, advice about locations for certified seeds and fertilizer and about irrigation scheduling; assistance with soil testing; improvement of layout method to border and furrow irrigation; physical improvements with concrete outlets; and measurement structures (weirs). Plots selected for demonstrations receive these services without charge, although farmers are required to supply seeds, fertilizer, pesticides, and labor themselves. The following table lists the standard CWC extension package for the Punjab and those elements included in Pakpatten demonstrations. It also compares who pays for the service: CWC, OFWM, or the farmer.

CWM and OFWM Demonstration Services

<u>Extension Elements</u>	<u>CWM CWC</u>	<u>Pakpatten</u>	<u>OFWM</u>
Precision land levelling (laser)	CWM	CWM	farmer
Irrigation improvements (outlets, siphon tubes)	CWM	CWM:outlets	farmer
Seeds, fertilizer	farmer	farmer	farmer
Measurement structures	CWM	-	-

A full-time Field Assistant was assigned full-time to the sub-project area by Agricultural Extension in July 1988. He works with eight contact farmers on the coordinated watercourse as well as other farmers in the command. The Field Assistant received 30 days training in water management at the Niazbeg OFWM training center prior to undertaking his assignment.

Demonstration plots in Pakpatten have fallen far below anticipation. Whereas demonstrations have either exceeded or roughly matched anticipation in the other three Punjab sub-project areas, this activity has lagged far behind here. Only 96 of 269 plots have been included in the program to date. Demonstration plots are the only numerical target in which this sub-project falls behind the target.

Efforts to organize demonstration plots on the one coordinated watercourse in Pakpatten have tended to concentrate project resources among a few influential farmers. There are 170 shareholders on the watercourse, but only eight-two actually work the land. Of these, seven are members of the executive committee and worked with the project in the selection of four plots for demonstration. Two of the four demonstrations were held on land owned by members of the executive committee. None of the farmers appear to have played a demonstrable role in determining the elements of the extension package. The SMO has also promised a set of farm implements but none have been delivered nor is there an apparent plan for the placement of the equipment.

The SMO, Agricultural Extension staff, and TAT need to work jointly to develop an approach which permits the largest number of farmers to articulate and prioritize their requirements and develop a program in response. The extension program ought to be introduced to farmers during the initial meetings, prior to construction, a time when they will be most enthusiastic and receptive to project interventions.

3.5.3 Credit

Thirty-five of the shareholders of the coordinated watercourse also formed a cooperative society in 1983. From 1983-87 twenty member received loans for the purchase of fertilizer. In 1987, the number increased to thirty-eight when the watercourse was selected for special services. They continued to use the loan for the fertilizer purchase.

Securing of cooperative bank loans and individual loans from commercial banks for farmers on other watercourses was another activity of the project. Many of these loans appear to have been given to influential landowners, but data are few.

Securing credit from the cooperative and commercial banks was a central focus of WUA activities in Pakpatten, largely through the now discontinued SCC meetings. A change in policy halting interest-free loans has undermined the project. Farmers expressed a reluctance to take part in future credit programs.

4. Institutional Development Issues

4.1 Monitoring and Evaluation

According to the M&E Unit, head and tail gauges have been installed on the distributaries and minors, however it was not able to produce any records of measurements or data to show that supplies had increased. No measurements are being taken on the watercourses. Watercourse improvements appear to have caused an increase in the water delivered during a farmer's turn. However, in the absence of data this observation remains supposition.

On a few watercourses in Pakpatten, improvements in the watercourse also led to a shift from lift to gravity flow for some of the farmers. There were no data available on the extent of this shift or savings in time and costs.

Three hundred private tubewells have been installed since CWM started. This investment may have implications for the development of project activities. The Liaison Officer and the SDO are collecting data on their exact number, hours of operation, and energy a part of a crop water requirement study. This seems to be the beginning of a PME effort in the sub-project area. The PME Unit in the SMO ought also to determine if private tubewell development is more marked in the command than in adjacent areas. Such a study, best conducted through rapid rural appraisal techniques, may give an indication of project impact.

4.2 Inter-agency Coordination/Cooperation

CWM appears to have improved contacts and cooperation between OFWM and the PID. The PID now provides data on sanctioned discharges and the design of the outlet and is said by OFWM staff to be more responsive to requests for closing the outlets when construction on the watercourse begins.

5. General Issues

5.1 Productivity/Equity Issues

Farmers indicated that there were a number of benefits from watercourse lining: an increase in water, water reaches the tail, maintenance requirements are reduced, fewer snakes on the watercourse making patrolling easier, and a shift from lift to gravity flow. Farmers also cited overall project benefits: they had greater access to government officials, better quality seeds, and better understanding of loan procedures and access to credit. Without continued SCC meetings, these benefits may well disappear. Further monitoring will be required to determine if the access to officials, project resources, and loan facilities is being concentrated in a few shareholders and what their effects have been on production and income.

5.2 Recommendations

SCC meetings ought to be reinstated immediately. Holding them in the command rather than in a government office was a constructive method which secured greater farmer participation. However, in order to avoid their being a forum for complaints, rather than more substantive communication, some structuring of the meetings may be required;

A longer lead time and more flexible approach by OFWM will be required when working with farmers who have been disinclined to take part in the program. The WUADS may be helpful in determining the reasons for their opposition. The lining of every watercourse in the command may not be a desirable goal because conditions on the watercourse may not warrant it;

Monitoring ought to be initiated on changes in supplies on the watercourses, as well as on the minors, where it is presently being done;

A participatory approach to strengthening water user associations ought to be introduced in the sub-project area. Roughly thirty watercourses remain to be lined. The approach will require a longer lead-time, better communication with farmers about their rights and responsibilities during construction and repayment, their active involvement during the survey and design, skills transfer, and a decision-making role in the design and implementation of other project activities;

The WUADS and PME Unit ought to institute a program for monitoring and assessing the activities in improving credit facilities in Pakpatten. Data are too few to draw other than general impressions; and

The formation of WUA federations in Pakpatten is premature. The strengthening of WUAs through a decision-making and supervisory role would be much more profitable at this time.

Pakpattan Background Statistics

Population (000) - 1981 Census	144
Number of Villages	80
Gross Area (000 acres)	119
Command Area (000 acres)	97
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	217
- public tubewells	
- private tubewells	54
- Total	271
Crop Water Required (000 ac/ft annually) at Watercourse Head	420
Average Crop Yields, FY81, kg/ac:	
- kharif Rice	780
Cotton	340
Sugarcane	13,280
Fodder	5,820
- rabi Wheat	770
Fodder	15,550
Estimated Incremental Cropping Intensity (%):	
- present (p)	135
- future, without project (w)	139
- future, with project (W)	154
- increment W over w (%)	11
- increment W over P (%)	14
Projected Net Farm Income (000 Rs) Per Capita:	
- present	1.7
- future, without project	1.8
- future, with project	2.2
- increment with over without project (%)	22

Source: World Bank, Staff Appraisal Report: Pakistan Command Water Management, April 1984

APPENDIX 3-D

6R/HAKRA SUB-PROJECT SITE VISIT (PUNJAB PROVINCE)

1. Circumstances of Visit

The team travelled to Bahawalnagar on the evening of 28 August. PID engineers and a representative of NDC-NESPAK gave a briefing concerning the sub-project that evening. The 6R Hakra Sub-project was visited the following day. The evaluation team consisted of Gene White, Tariq Husain, and Stan Peabody. The team was accompanied by Siddique Ahmad Chaudry, PID Project Manager, IDA Projects, Punjab, and Chaudhary Mohammad Ashraff, Project Director, OFWM.

During the field visit the Hakra Branch, the 6R Distributary, the 1R/6R minor, Coordinated Water Course 9A (22620TRI) and selected excavation works for drainage canals were visited. The team met with more than 25 members of a WUA on the CWC.

2. Background

2.1 Physical Setting

The sub-project is situated in Tehsils Haroonabad and Fortabbas of District Bahawalnagar. The cultivable command is 103,800 acres.

The sub-project has been supplied irrigation water via canals since the early 1900s. The water table had been slowly rising for 70 years. Water logging and salinity problems started to be severe in 1980. At that time consideration was given to some remedial action to reverse this condition.

Tubewells and surface drains were investigated. Tubewells were finally discarded because the groundwater aquifer is shallow and the water quite saline, 3,000 PPM. It was decided after further investigation to construct a series of interlinking drainage channels and to line distributaries, minors and watercourses.

3. Sub-project Activities

The civil works proposed for 6R Hakra consisted of canal rehabilitation, canal lining, remodelling of canal outlets, lining of water courses and construction of surface drains and drainage structures.

Precision land levelling, PLL, was proposed on a pilot basis. The formation of WUAs were proposed to receive and effectively utilize increased water and non-water inputs in order to achieve increased agricultural production.

Demonstration plots were proposed to demonstrate the effectiveness of improved agricultural practices and the use of improved water management and non-water inputs.

3.1 Sub-project Management Office

At the 6R Hakra Sub-project the SMO had one resident representative who had the title of liaison officer. He acted as the representative of the SMO for coordinating the project activities at the sub-project site and carrying out administrative tasks. He was also attached to the M & E and assisted in data collection. In addition to the members mentioned above we were joined in our visit by a member of the SMO's Water Management Unit. This member also was the SMO's computer expert.

The evaluation team was also accompanied by the head of the Agricultural Extension service who was working with WUAs in giving them assistance in obtaining non-water inputs. Members of the SMO staff had worked with

the WUA on the CWC. These activities were quite evident when discussions were held with the farmers. The liaison officer did not seem such a strong link between the SMO and the sub-project, rather he was a member of the SMO staff who was in residence.

3.2 Civil Works

The goals were to carry out the civil works construction and in conjunction with this task organize WUAs along the watercourses that were to be lined so that these groups could carry out the unskilled labor tasks of lining the watercourses and maintain the watercourses after the lining had been constructed.

Since 1980 the water table in this sub-project area had risen nearly to the ground surface and had resulted in severe water logging and salinity problems. For this reason both surface and subsurface drainage was investigated. Because of the shallow groundwater aquifer, subsurface drainage which could result from the installation of tubewells was discarded and a system of surface drainage channels were planned. Forty percent of the of the watercourses were to be lined because of the severity of the water logging problem. This lining was meant to significantly reduce canal seepage to the groundwater reservoir which was already near the ground surface.

The proposed targets and the actual progress for the civil works construction is presented in the following table. The progress indicated is up to June, 1988:

Civil Works Progress - 6R Hakra

<u>Description</u>	<u>SAR Target</u>	<u>Scheme Cleared</u>	<u>Actual</u>
Canal Rehab, miles	25.89	24.89	24.89
Canal Lining, miles	33.40	37.16	28.50
Remodel Outlets, nos.	281	66	66
Surface Drainage, acres	36,000	36,000	2,000
Water Course Lining, nos.	225	181	181
PLL, acres	6,720	8,123	6,222

The progress of lining of minors and water courses is adequate, but the progress on construction of drainage canals is poor. Four inter-connecting branch drainage channels were being constructed. Due to the high water table and mushy soil conditions, the progress of excavation by dragline was proceeding slowly. During the rainy season excavation progress is virtually nil.

The quality of construction noted for lining of minors and water courses was observed to be adequate. However the drainage canals were not being constructed to the lines indicated on the plans. This situation was due to the high water table and occurrence of recent rains that had caused channels slopes to subside. It was noted by members of the PID that due to the high water, the excavating machines had been shifted elsewhere. This was not an acceptable excuse for the conditions noted. The quality of construction for drainage canal structures noted was adequate.

3.3 Non-civil Works

3.3.1 Non-civil Works Goals

In the non-civil works portion of the project, the goal was to first organize, train, and assist farmers in WUAs to make beneficial and effective use of the increased water supplies through improved water management techniques, and to take advantage of the non-water inputs made available by the project.

In discussion with the farmers who were members of the WUA on the CWC, it was clear that the farmers were very interested in the sub-project activities and had a keen interest in obtaining credit for fertilizer and farm implements. They stated that with the improved water conditions, a shift would be made to crops such as fruit trees that would provide them greater income.

3.3.2 WUAs/Demonstration Plots

The formation and registration of 180 WUAs were proposed for this sub-project. To date it is reported by the SMO that 196 have been registered. 415 demonstration plots were proposed for this project. To date the SMO reports that 291 plots have been set up. A long discussion was held with members of the WUA on the CWC 9A (22620TRI) of 1R Minor of the 6R Distributary of the Hakra Branch. Following are some of the main points learned from these discussions:

- Farmers can cultivate approximately 50 per cent more area due to the watercourse and minor lining;
- The lining of the watercourses at the head end has resulted in less theft of water;
- Formation of the WUA helped in working out agreement pertaining to the cutting of trees that were on the alignment of the watercourse improvement. Previously, disputes arose among different families along a watercourse to be lined through the OFWM Program. The villagers had refused the lining. They could not agree about cutting down a tree which was required for canal improvement. The trees were too valuable. With the formation of the present WUA and the encouragement of the SMO, cooperation improved and farmers accepted the lining. This led other villagers to accept lining on other watercourses;
- Through the WUA, some credit was obtained both on an individual basis and through a cooperative. The farmers stated that it was easier for them to obtain credit on an individual basis. They did not actually receive money, but were given a credit voucher which was then used at the fertilizer dealer to enable them to receive the fertilizer;
- The maintenance of the watercourses is easier because of the watercourse improvement;
- The farmers usually did the labor themselves when the lining works were carried out and did not hire labor. They also paid for the unskilled labor. They did not complain about this cost and were prepared to have additional watercourses lined under this same arrangement. They further stated that they understood that they would have to pay back 10 percent of the cost of the bricks and cement after a two-year period. Some watercourses had been lined for over two years, but no system has been started for collecting the repayments. The SMO stated that setting up this mechanism was in process;
- The farmers stated that they wanted the construction of the surface drains;
- One farmer had donated some of his land on which one of the drains had been proposed;
- Maintenance has been reduced for head-enders but not necessarily for tail-enders. The system used for maintenance consists of all the owners located along the watercourse to gather at the head of the watercourse and then to move down the watercourse carrying out maintenance. As the maintenance was completed for a portion of the watercourse located through a given farmer's land he would drop out of the activities. At the head, since the watercourse was lined, there was less work to do than previously, but the tail-enders' work, as can be seen, was virtually unchanged from the previous conditions;

- The farmers stated that their total production had increased due to irrigation of a larger area because of increased water availability and that they had some increase in yields due to increased use of fertilizer;
- One farmer stated that he had shifted to growing some fruit trees. His income per acre had increased;
- The farmers stated that a SCC meeting had been held usually about once a month. The outcome of the meetings were not so satisfactory though. Agreements made in meetings were not followed up. The farmers stated that large numbers of farmers attended;
- Farmers stated that they like the pucca nuccas and want more;
- Farmers, of course, stated that they wanted more watercourses lined. They would agree to pay the same amount that they had paid previously, but it is not clear if they would pay an increased share; and
- The farmers stated that lining of minors and distributaries had brought them big benefits in the form of improved and more reliable water supplies. They were receiving water at tails of minors that had not received water previously. One of the biggest benefits was a reduction in water logging. This may have been partly as a result of the two previous dry season. The lining did, without doubt, reduce canal seepage losses.

3.3.3 Productivity/Equity

In discussions with the farmers of the WUA on the CWC in this sub-project, they stated that their total production had increased due to more land being irrigated and productivity had increased due to the use of non-water inputs, particularly fertilizer. They stated that the water was now more equitably distributed. There was less theft and tail-enders now got more water and head-enders were getting their proper discharge rather than the excess that they formerly took. The gross production increases were more as a result of extensification rather than intensification. One farmer did state as noted above that he had shifted to fruits trees which provided him with a greater income.

3.3.4 Improved Water Management

The TA Engineer and Agriculturalist carried out a study of a possible alternative cropping pattern based on the available water supply on the Coordinated Water Course No. 9A/22620/TR-I of IR-6R. A program of water measurements was started. A computer program which could compare alternate cropping patterns with available water supply was developed. Data for the above mentioned study was collected from the farmers. However, in discussions with the members of the WUA on this watercourse, no evidence of changes in water management were noted. Most farmers claimed only that, due to the lining of minors and watercourses, the amount of water they received had improved and that they had used this water to irrigate more land. Farmers stated that their supplies were more reliable and tail-enders got a greater share of irrigation water than previously. Head-enders were not present at our meetings. This may have indicated that they were not so interested in the project activities since they were getting reduced supplies, i.e., their proper share. A few farmers did state that they had changed crops.

The TA Water Management Specialist was met in the office of the SMO. He was working actively with the SMO staff on matters relating to water management. He did not accompany us on our visits, but his presence was noted.

3.3.5 Credit

SMO project staff have tried hard to act as effective intermediaries between farmers and banks. There has been some success in obtaining loans for individual farmers, but this has proved unsustainable: changes in local bank management led to a discontinuation of loans. Group credit is available only from the Cooperative Department. One WUA is being organized as a cooperative, but has yet to be registered. The members of this WUA are familiar with procedures for obtaining cooperative credit, but have not yet applied for a loan.

3.3.6 Fertilizer

Increased water availability has led to a sizable increase in fertilizer use. Farmers are obtaining fertilizer from established dealers, who give seasonal credit. The project, as well as some farmers, are contemplating collective purchasing and transportation arrangements. The most commonly-cited complaint by farmers was that fertilizer was not available on time.

4. Institutional Development Issues

4.1 Monitoring and Evaluation

The TA Team had carried out a study of alternate cropping patterns based on the water supply of the 6R Hakra System. No evidence was seen that the results of the study had been implemented in the field.

4.2 Water Management

No direct evidence was noted that water management techniques had been introduced. Some precision land levelling had been carried out, but it was not clear that rows and furrows had been introduced to more efficiently control the delivery of irrigation water supplies.

4.3 Sub-project Coordinating Committees

SCC meetings were held in the first quarter of 1988, but not since. The main comment was that decisions taken at the meetings were not implemented.

4.4 Inter-agency coordination/cooperation

As stated above a member the Farm Extension was actually working in the field and utilizing many farm extension agents. The cooperation with this agency appeared to be excellent. The PID was quite visible and they cooperated with the SMO. It was not clear if there was good inter-agency coordination.

5. General Issues

5.1 Consultancy Services

The TA Water Management Specialist was working in the field independently from the evaluation team. Brief discussions were held there concerning his activities. He was setting up a weather station and consulting with SMO persons regarding water measurements required for system analysis and monitoring and evaluation. SMO Staff stated that he had been very helpful in dealing with the many problems being encountered at this sub-project.

5.2 Lessons Learned/Recommendations

- **With the studies and information already assembled by the WMU and the TA Team for this sub-project, simple alternate water management plans should be prepared and tested at a few selected location during the next crop season; and**
- **Drainage Channel excavation progress should be improved. The outfall area should be investigated in detail to insure that it is adequate.**

5.3 Other Noteworthy Matters

Since the evaluation party was smaller and the SPM was not travelling with the team, it was easier to hold discussions with farmers and to direct the trend of the conversation. Nevertheless, the farmers were quite quick to inform us that the increased area due to increased water supplies was 50 percent.

6R/Hakra Background Statistics

Population (000) - 1981 Census	136
Number of Villages	90
Gross Area (000 acres)	133
Command Area (000 acres)	104
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	250
- public tubewells	
- private tubewells	
- Total	250
Crop Water Required (000 ac/ft annually) at Watercourse Head	439
Average Crop Yields, FY81, kg/ac:	
- kharif	
Rice	590
Cotton	280
Maize	360
Sugarcane	14,620
Fodder	5,330
- rabi	
Wheat	830
Fodder	12,940
Estimated Incremental Cropping Intensity (%):	
- present (p)	127
- future, without project (w)	120
- future, with project (W)	151
- increment W over w (%)	26
- increment W over P (%)	19
Projected Net Farm Income (000 Rs) Per Capita:	
- present	1.6
- future, without project	1.6
- future, with project	1.9
- increment with over without project (%)	27

Source: World Bank, Staff Appraisal Report: Pakistan Command Water Management, April 1984

APPENDIX 3-E

NIAZBEG SUB-PROJECT SITE VISIT (PUNJAB PROVINCE)

1. Circumstances of Visit

The full evaluation team visited Niazbeg sub-project on August 30, 1988. Mr. Saleem Arshad, PM CWM; Mr. Mushtaq Ahmed Gill, Director OFWM; Ch. Siddiq Ahmed, Superintending Engineer PID CWM; Extension Officers; and Civil Works Consultants accompanied the mission. Some reaches of Niazbeg Distributary and Kamogil Minor, outlets and watercourses were visited and farmers present were interviewed. Based on the information provided by the project staff during the visit and in Niazbeg project office on August 25 and September 8, 1988, as well as by the farmers and observations at site, the status of the sub-project is reviewed in this report.

2. Background

Niazbeg sub-project area, with a population of 63,000 living in 34 villages, lies in Kasur District on the two sides of Lahore/Multan National Highway. Since it is close to Lahore and falls in an industrial zone, the urban and the industrial effects are influencing it rapidly. The area lies in the command of Niazbeg Distributary, which has a head discharge of 260 cusecs and takes off at tail of Lahore Branch Canal. Niazbeg Distributary RD 76, 817 to Tail RD 185,240 and its three Minors -- Kamogil, Jalleke and Thatti Utar, with total discharge of 164 cusecs and length of 29 miles -- irrigate this area. The area is served by 85 outlets or watercourses. The water allowance is 3 cusecs per 1000 acres and the design intensity was fixed at 75 percent. The irrigation system being part of old Upper Bari Doab (UBD) Canal is 129 years old, having come into operation in 1859.

The sub-project area falls between Rohi Nallah and River Ravi and slopes towards the river. Therefore it is naturally drained. Topography is level. 83 percent of the area comprises well-drained and well-structured soils, which are suitable for most of the crops. The water table depth in the 5 percent area ranges between 10 to 15 ft, while in 95 percent area it lies below 15 ft from the natural surface. Thus there is no waterlogging or salinity problem and the water is sweet. The average annual rainfall is 15.4 inches, with 80 percent occurring during summer season.

To increase the cropping intensity, the Irrigation Department had installed 48 public tubewells of 2.5 cusecs each and the farmers have installed another 315 private tubewells of about one cusec each. The pre-project cropping intensity was 170 percent. Installation of private tubewells continues and about 100 more tubewells have been installed during the project period.

Niazbeg sub-project falls in the Punjab rice zone where fodder, rice and cotton are main Kharif crops and wheat is the main Rabi crop. Wheat yields are slightly better while cotton yields are lower than some other sub-project areas of Punjab.

The project feasibility survey of 1983 had indicated that none of the farmers interviewed was using plant protection measures due to high prices of pesticides and lack of knowledge about their use. The situation however changed subsequently. It was noted that a large percentage of water delivered at the head of the irrigation system was lost on the way before reaching the farms. About 15 percent was lost in distributaries and minors while another 25 percent was lost in the watercourses due to seepage. Further, outlets in the head reaches of minors were over-drawing while those in tail reaches were drawing up to 50 percent less than their authorized discharge.

The sub-project proposed to build the institutional capabilities of the concerned Provincial Government Agencies and also to carry out the physical works, as noted in Table I below, to improve the existing water management and to increase agricultural production.

3. Sub-project Activities

The mobilization of the CWM Project has been slow due to various reasons. Staff of the Provincial Line Agencies was not posted until mid 1985. The Civil Works Supervisory Consultants were appointed in October/November 1985. Provincial Policy Committee (PCC) is functioning since January 1985, and Project Coordination Committee since January 1986, and Sub-Project Coordination Committees (SCCs) for each Sub-Project were established in June 1986. The Expatriate TA Team reached site in January/February 1987. Therefore the sub-project implementation in fact started during year 1985-86 and gradually picked up speed. At this time the project is well under way.

3.1 Sub-Project Management Office

There are four sub-projects (Shahkot, Niazbeg, Pakpattan and 6R-Hakra) in Punjab, which are handled by the Project Manager located at Niazbeg, Lahore. This is different from other three provinces, where SMO is responsible for one sub-project only. A more detailed description of the SMO appears at Appendix 3-A.

The SPM Punjab has three Liaison Offices located in sub-projects to assist him:

- (i) Assistant Director 6R/Hakra at Haroonabad
- (ii) Assistant Director Pakpattan at Vehari
- (iii) Assistant Director Niazbeg and Shahkot at Lahore

3.2 Relationships with Other Agencies

3.2.1 PID

SMO does not find any difficulty in dealing with PID CWM staff but there are problems with PID O&M staff. The regular O&M staff is still responsible for O&M of channels, approval of remodelling and shifting of outlets, warabandis, crop assessment, and approval of WC Nakkas. PID O&M staff and CWM staff, being separate entities coordinate only at Secretary level. The approvals of CWM matters get delayed.

In Niazbeg Distributary, the influential farmers in head reach get extra water causing shortages lower down in the system with CWM, who can't do anything because operation of the system is with O&M staff.

The SPM suggests that there should be a coordination of PID CWM staff at Superintending Engineer level; Executive Engineer CWM should report to O&M Superintending Engineer, who should be on Project Coordination Committee.

3.2.2 Extension Services

The Extension Directorate is organized on District, Tehsil, Markaz and Union Council level without consideration of CWM requirements. The staff works on almost regular routine of their duties. Project extension work gets inadequate attention. Therefore, significant progress is not evident. PM realizes the problem but he is not sure how to proceed because Extension Services is an equal level sister Directorate.

3.2.3 OFWM

This Directorate handles the civil works on the watercourses and PM has no difficulty with them. OFWM does not do anything beyond Civil Works.

3.2.4 Civil Works Supervisory Consultants

The SMO find no difficulty with these consultants.

3.2.5 Project Coordination Board

The SPM suggests that there should be a Board of Senior Level representatives (Grade-19, Directors/SEs) of the Agencies with adequate financial, legal and administrative powers. It will improve the interaction and efficiency of Line Agencies and withstand the outside pressures.

3.3 Civil Works

The physical progress in Civil Works as on June 30, 1988 is given below:

Niazbeg Civil Works Progress

<u>Sl.No.</u>	<u>Item</u>	<u>Total Targets</u>	<u>Quantity</u>	<u>Achievements (June 30, 1988) %age</u>
1.	Canal rehab.	11.44 miles	11.44	100
2.	Canal remodelling	13.0 miles	13.0	100
3.	Lining irrigation Channels	16.2 miles	14.00	86
4.	Remodelling of Outlets	85 Nos.	62	73
5.	Improvement of Watercourses	68 Nos.	58	85

Considering the teething troubles involved in a project of pilot nature and its complexities, the physical progress is creditable and it seems reasonable to assume that the planned targets will be achieved by the end of project period in 1989.

The civil works fall in two categories: (a) irrigation works, and (b) water course improvements. Each category is dealt with separately below.

3.3.1 Irrigation Works

These works include the rehabilitation of the distributaries and minors, lining of channels with capacity less than 30 cusecs, remodelling of outlets and construction of drainage works.

For this purpose, the PID has created a full-fledged CWM Project Circle, headed by a Superintending Engineer, with three Divisions and several Subdivisions. The PID staff only does rough survey, invites tenders, awards contracts, supervises works and makes payments. The proper surveys, investigations, designs, cost-estimates, schemes, reimbursement applications, progress reports and annual work plans are all prepared by the Supervisory Consultants, M/s NESPAK-NDC. These Consultants are also responsible for spot-checking of works during construction and checking of quality and quantity of completed work. For that purpose they have assigned a Junior Engineer on a one-half time basis, which is inadequate and the quality of work is hardly satisfactory.

On the Niazbeg distributary, the brick lined portion of this channel has growth on its slopes, and the lining is damaged at places. In another lined reach, the trees in the middle of the embankment have not been removed,

making the inspection impossible and weakening the banks. The lining is wavy and joints are only partially filled. In yet another location, a bridge is submerged and obstructs flow. It should have been raised.

On Kamogil Minor, the lining is wavy and joints are not filled.

The outlet design prepared by consultants includes a pipe intake from the channel fixed at 45 degree to the inflow and discharging into a chamber where the water level is the same as in the channel, and then an outlet, separate from the channel, is constructed. In this design, any subsequent adjustments can be made without disturbing the channel bank. It is a neat arrangement, and a definite improvement in design.

Before the CWM Project, Niazbeg Distributary was only a Sub-Engineer Section of O&M Division. Even with the creation of the CWM Circle, the O&M is still with O&M Division and only technical control of channels is transferred. Revenue assessment and Warabandi cases, i.e., changes in outlets are still handled by the O&M Division. There are separate Chief Engineers for O&M and CWM works and the only coordination is at the Secretary level. This dual control of the system with no coordination at the working level seems likely to cause problems which may result in delays and inefficiency.

Surveys, design, and scheme preparation are the normal function of the Irrigation Department. Even in the ISRP/ISM Project, the PID O&M Staff performs these functions and the Consultants review their work. With large and exclusive PID construction staff for CWM, (while quality control is also inadequate) to pass on the normal functions of PID to consultants is an anomalous situation. It is weakening the existing capability of PID and is contrary to the institution building objective of the Project.

3.3.2 Water Course Improvements

There are 85 watercourses in the sub-project area and 80 percent, i.e. 68 of them, are to be improved. The improvement includes its rehabilitation with compacted soil in its entire length, lining of 15 percent of its length with cement-bricks, providing pacca nakkas one per 10 acres at junctions and authorized outlets, four culverts per watercourse, and a limited number of buffalo baths.

The improvement of a watercourse is to be financed through cost-sharing arrangement as in IBRD's OFWM Project. In Niazbeg, the shareholders of the watercourse will provide labor and 20 percent of the cost of the material. The repayments will be made by the farmers in ten bi-annual interest-free installments. The remaining cost of material, engineering and supervision will be provided by the Project.

OFWM Directorate is responsible for the improvement of the watercourses. The Directorate Staff does surveys, prepares designs and the lining schemes in consultation with the WUA for the watercourse. The scheme is reviewed by the Supervisory Consultants, M/s ACE-ZCL and after clearance by A.I.D. through the issuance of a PIL, the work is executed. It is supervised by OFWM and WUA and spot checked by Supervisory Consultants and A.I.D. personnel. The Consultants prepare PILs, progress reports, annual work plans and reimbursement applications. The Consultants have skeleton staff and therefore their supervision of construction is very minimal and inadequate. Subsequently, the design and scheme preparation has also been assigned to consultant and additional staff has been authorized for this purpose.

Farmers fully participate in the construction of the water course through WUA. WUA initially participates in the planning and re-design of the water course including selection of reaches to be lined, location of cattle ghats and road culverts. Then the WUA supplies all labor for construction of embankments and lining of watercourse and supervises construction.

So far 58 watercourses out of the total of 68 have been improved.

Inspection of the watercourses at RD 115, 980L and RD 135,500R lead to the following evaluation:

- **The quality of work is barely satisfactory;**
- **Before lining there were large heaps of silt at head of watercourses formed over the past years, requiring continuous removal; and**
- **Farmers feel that previously they had to clear the watercourses every month and now they clear it after 6-7 months.**

The farmers at the tail of this watercourse indicate that they are not interested in lining because most of the land is sold to industrialist for establishment of factories in the area. So this is a socio-economic change taking place in parts of Niazbeg area, being close to urban area of Lahore and falling in industrial area. The tail gauge observed was 1.6 ft against 1.2 ft authorized, which PID claimed was routine after lining of minor but the farmers complained that this was exceptional. It was learnt that influential land owners at head of Niazbeg Distributary draw more water causing shortages lower down.

3.3.3 Watercourse Lining

The A.I.D. PPA provides for brick or cement lining of 15 to 50 percent of total length of a watercourse. IDA SAR provides that in FGW areas (like Niazbeg), cement brick lining would generally be limited to 15 percent of total length of watercourse. The intention of the project seems to be to line the critical reaches to about 15 percent and this limit could be exceeded where full justification is given. The overall project budget would of course provide the ceiling.

It was noted that there is a constant struggle going on between farmers, the SMO/OFWM, and USAID about the quantum of lining. Farmers want more lining, justified on grounds of vicinity in villages (where trespass damages the WC), cattle ghats and poor soil, etc. and it is fully supported by SMO/OFWM but A.I.D. strictly limits it to 15 percent. A.I.D. may wish to review its position in view of the following:

With the force account (labor and material) method of construction and involvement of no contractor, there is a considerable saving in project estimated costs of lining;

- **There is a definite justification for more lining;**
- **The water lining is a very visible and positive input of the project, widely appreciated by farmers;**
- **Increased level is already being considered for Sind Province; and**
- **Farmers seem to be willing to contribute more towards the cost if approached properly.**

It is understood that OFWM has already done additional lining worth about Rs. 9 million, which is not approved/reimbursed by A.I.D. and additional lining of another 66 watercourses is lying pending approval with A.I.D.

The Agriculture Department/Punjab is very unhappy about the perceived rigid attitude of A.I.D., FAR and above-mentioned disputed cases of increased lining lying pending.

The issues might be resolved by adopting a reasoned approach. Where there is a justification for additional lining and the budget allows it, the addition should be approved and reimbursed. The OFWM has already learnt the lesson and will seek prior approval in future.

3.4 Non-Civil Works

Civil Works on irrigation channels as well as on watercourses are visible components of the project, where most of the project funds are being spent and the progress can be easily measured. Further, the farmer gets about 50 percent of the financing for his watercourse. Therefore civil works component has dominated all other components of the project. Of course, it is an essential component.

The non-civil sub-project goals include:

- Formation of 68 Water Users Associations (WUAs);
- Provision of water management through Precision Land Levelling (PLL) of 2,400 acres, and by matching crop water requirements with available water;
- Provision of credits to farmers; and
- Provision of non-water inputs.

The project efforts so far towards achievement of the above goals are stated below:

A. WUAs

All the 68 WUAs planned have been formed. Out of 68 watercourses, 58 or 85 percent were improved by end June 1988. It is reported that regular meetings are held by the staff of CWM with the WUAs for improving water and non-water inputs. It seems that the objective of formation of WUAs, and their participation in the planning and execution of water course improvements has been achieved. However, it is understood that after the improvement of water course the enthusiasm of the WUAs declines and they do not show adequate interest in the O&M of the watercourses.

No significant progress has been made towards the formation of Federations.

WUAs of Coordinated Water Courses (CWCs) do show interest because of the concerted efforts of all line agencies, inputs by the Project and selected WUA, which may see the future benefits in improvements of water and non-water inputs. There is only one CWC in each sub-project and therefore the success is very limited.

B. Extension Services

Against 148 demonstration plots planned, 73 or 49 percent have been established so far. It is reported that the other farmers are involved in the Demonstration Plot activities through farmer days at these Plots.

The Extension Services operate almost as per their normal routine with some attention to CWM activities. Further, the improved practices cannot be implemented/ demonstrated on small Demonstration Plots. Therefore not much can be expected from the Demo Plots.

C. Improved Water Management: Precision Land Levelling

Against 2,400 acres PLL planned, 1,985 acres or 83 percent have been levelled. Because of the reasons given above for Demo Plots and because PLL being an expensive operation, not much follow-up by other farmers is noticeable.

Also, with the implementation of civil works, the availability, equitable distribution and reliability of water have improved. Further, the farmers continue to install more private tubewells which also increase water availability.

The TA Team was supposed to develop an irrigation operational management plan for the sub-project areas which would permit the optimum use of surface water and public and private tubewells. TAT has prepared no plan so far and therefore action in all sub-project areas is held up. However, it is felt that with additional water available, improvements in existing cropping patterns in consultation with the farmers and improvements in water usage at farm level, it should be possible to match crop water requirements to some extent with the availability of water. In our discussions with PID, they showed their willingness to consider a water management plan prepared by TAT, in spite of the fact that the Indus Irrigation System is availability-oriented.

D. Credit

During previous years, the Government had allowed interest-free loans to farmers but this year that facility has been withdrawn and the farmers have to pay 8 percent interest on loans. This is a discouragement to the farmers. In spite of efforts to form cooperative society in CWC area of Niazbeg sub-project it has not materialized so far due to poor cooperation of concerned farmers. Therefore, there is little progress so far in providing loans to the farmers in this area.

E. Non-Water Inputs

The seeds, fertilizers and pesticides remained available in market but with the change in credit policy by the government, the farmers could hardly purchase them in significant quantities. The only effort was Training and Visit (T&V) activities in the area by the Extension Services but that is slightly more than their routine function. Therefore, there is no significant improvement so far in the sub-project area in non-water inputs.

4. Institutional Development Issues

4.1 Planning, Monitoring and Evaluation

The Project Manager has one Assistant Director heading this unit. Unlike other 3 provinces, in Punjab, this unit is responsible for all the four sub-projects and thus is thinly spread. Additional staff requested by the SMO is yet to be approved by the Provincial PPC. The Unit is to be assisted by implementing agencies, Punjab Economic Research Institute (PERI) and TAT M&E Specialist.

The SMO is to prepare Annual Work Plans. Such plans are being prepared in consultation with PID, OFWM, Extension Services, Chairman WUAs and Consultants, and have been approved by the PPC. The SMO is also required to do project monitoring. There are two types of monitoring, project inputs and project outputs.

Project Inputs: These include civil works, procurement, staff recruitment and implementation of crop development program. These activities are being monitored through quarterly and annual progress reports by all implementing agencies, which are then consolidated by the SMO. These reports indicate the physical and financial progress against annual plan targets.

Project Outputs: The outputs resulting from total project efforts are to be measured to provide water in respect of its adequacy, equitable distribution and reliability, and non-water agricultural inputs. The outputs would include changes in water supplies, cropping intensities/crop yields, non-farm incomes, and social well being.

The TAT and PERI are supposed to advise the SMO in development of M and E plan, and to assist in data collection and evaluation. So far sporadic efforts have been made towards collection of data. No definite plan seems to have been prepared by the TAT as yet, though it does render assistance to the SMO in respect of training of staff and in data collection. PERI is understood to have collected baseline data and other data, but a report is still awaited.

Therefore, there is no proper M&E report so far to provide project indicators. However, in this respect, as mentioned above, there are definite visible indicators towards improvements in availability, reliability and equitable distribution in the irrigation system with the implementation of civil works.

4.2 Water Management

A small water management unit has been created in SMO to:

- collect and analyze data
- analyze system distribution capabilities
- determine crop water requirements
- aid farmers and PID in better matching cropping system and irrigation supplies

The purpose of this unit is to focus on improved water scheduling, improved reliability, certainty and equitable distribution of water supplies, and the initiation of a pilot "warimetric" system.

The evaluation team was informed that the pre-project system was incapable of taking authorized discharge and there were no means to find out the constraints and inequities. Therefore, new control structures are provided at five miles or so and existing ones are to be calibrated. For the present some water measurements have been made.

A water management plan was to be prepared by TAT for sub-project. It is not yet finalized and its implementation can not yet take place.

PID has participated in CWM Project to improve the channels. PID is waiting for the water management plan, which is supposed to be prepared by TAT: if that plan proves to be feasible, PID is willing to cooperate in its implementation.

4.3 Extension Services

The Extension Services staff is to advise farmers in implementing the water management plan which matches the cropping system with the available water supplies. So far no action could be taken.

4.4 WUAs/Federation

The water management plan is to be finalized and implemented in consultation and acceptance of the farmers. So far no action has been taken.

4.5 Sub-Project Coordinating Committees

A sub-project Coordinating Committee (SCC) has been formed for the sub-project since June 1986. The SCC is chaired by the Sub-project Manager and its members are representatives of line-agencies non-water input suppliers, and Chairmen WUAs. It meets quarterly. Individual farmers can also attend its meetings. The following matters are discussed in SCC meetings:

Annual Work Plan: Before preparation of Work Plan, the Project Manager explains its outlines to SCC and invites views on the priorities, problems, need of cattle ghats, breaching reaches of channels, and alignment of drainage. The line-agencies, OFWM, PID and Extension Staff take note of these matters, prepare their plans and send them to the PM. PM prepares framework of plan and sends copies to TAT and line-agencies for comments. After review the Annual Work Plan is finalized and sent to the PPC for approval. After approval it is implemented by SMO.

Progress: Line-agencies present the progress of last period (generally quarter). Plan for the next period is explained and SCC members give their input on policy matters.

Training Session: Agriculture Extension Staff explains the condition of crops and their needs. OFWM and other agencies also explain their procedures.

Other matters of concern to farmers may also be discussed at SCC meetings. These can include, among others: tail supply, watercourse material supply, additional watercourse lining, and credit complaints.

Individual or Associations submit their applications on the spot. Line Agencies are advised for action. Minutes of the meeting and commitments by Line-Agencies are recorded. Applications are sent to concerned Line-Agencies for action and follow-up action is taken by SMO.

SCC is doing useful work, trying to educate the WUAs and to help the farmers in solving their problems. SCC has its limitations where the policies of the Government come in its way. For instance, previously the farmers were allowed interest-free credit, which has been stopped and now they have to pay 8 percent interest, which farmers can't afford. SCC became helpless and could offer no solution.

Eight meetings of the SCC were held during the Jan-Mar 1988 quarter, where issues of shortage of supply, additional lining and installation of tubewells were discussed. No meeting was held during quarter April-June, 1988 because staff was busy in tours abroad, preparation of proposals for Phase-II, and in the World Bank-A.I.D. review mission visit.

SCC formation is a definite step forward but it can function in the future only if there is a coordinating office like the SMO.

4.6 Punjab Province Project Coordination Committee

Since there are four sub-projects with the PM, a Project Coordination Committee was also formed in January 1986 to facilitate coordination of Line Agencies. Representatives of SMO, OFWM, Extension Services, PID and local Civil Works Supervisory Consultants, and TAT are its members. Two meetings were held during quarter, April to June, 1988, where the progress was reviewed, achievements of targets was stressed, and coordination of design of outlets and watercourses was discussed.

4.7 Provincial Coordinating Committee (PCC)

The Provincial Coordinating Committee mandated in the project documents also exists, as a separate entity from the Project Coordination Committee mentioned above. This committee is chaired by Chairman, Planning and Development Board Punjab and Secretaries of Finance, Agriculture and Irrigation Departments are its members. PM is its Secretary. PCC deals with policy matters of project, approves annual Work Plans and staffing requests and monitors progress.

The Seventh meeting of PCC Punjab was held on May 9, 1988 when the annual Work Plan for 1988-89 was approved and other policy issues were also discussed.

4.8 Inter-Agency Coordination/Cooperation

4.8.1 Pre-CWM Situation

Before the advent of CWM, the line agencies were confined to their respective roles. PID was maintaining and operating channels and supplying water at watercourse head. It had contact with farmer through warabandi. Outlet problems were addressed and crop assessments were carried out, but there was no further involvement in on farm improvements or with the Agriculture Department, which operated independently and had contact

with farmers only through routine extension services. There was no coordinated working between Irrigation and Agriculture departments.

4.8.2 Project Stimulated Developments

CWM has brought the Irrigation and Agriculture Departments together under the umbrella of SMO and attempted coordinated working for the improvement of irrigated agriculture to the benefit of the farmers. The line-agencies and other non-water input agencies have been brought to the door of the farmer and he participates in the improvement process. This would have been an unthinkable situation previously, when the farmer used to run from office to office after the officials and got little help. Therefore, the project has brought about a definite change in the thinking and working of concerned agencies.

4.8.3 Constraints and Challenges

Though coordinated working has been made possible yet there are still some problems in proper coordination. The SPM does not have an authority over line-agencies and he has only limited influence over them. Since agencies like Extension Services have no stake in the process, more support to the SMO is needed to make this experiment a success.

As stated above, the project is slowly proceeding towards its intended goal and should be pursued vigorously by all concerned.

5. General Issues

5.1 Productivity/Equity Issues

The improvement of irrigation channels and water courses shows that:

- With the change of channel grade due to lining, the command has improved. For instance on Kamogil Minor, the command has increased up to 1.8 ft. In consequence, some of the uncommanded areas can now be fed by gravity. Some of the "Jallars" used for lifting of water have been eliminated;
- The outlets at head of channel used to draw extra water while the tails suffered shortages. With the adjustment of outlets, the distribution in the channels has become equitable; and
- The improvement of channels and watercourses has reduced losses of water and additional water has become available in the system.

Thus, the availability, equitable distribution and reliability of water have improved. Further, the farmers are putting in more private tubewells which also add to water availability.

Though no definite M&E data is available and nor any water management plan has been implemented so far, the farmers everywhere have reported increased cropping intensity and yields leading to increased productivity and farmer income.

5.1.1 Farmer Contribution

At the moment, the farmer is contributing all labor and 20 percent of the cost of materials for watercourse lining in Punjab, and in particular at Niazbeg. This lining is provided in 15 percent length of the watercourse. The watercourse improvement earthwork is all done by the farmer. So the farmer is already contributing more than 50 percent of the cost of watercourse improvement. Since the farmer is convinced of the improvement benefits

as we learnt while talking to farmers, he would be prepared to contribute more with the gradual withdrawal of subsidy as visualized by the CWM.

5.1.2 Non-Water Inputs

Because of the withdrawal of interest-free credit facilities, the small farmers cannot buy non-water agricultural inputs on credit as readily as before. With increased water availability, the farmers who can afford are using more non-water inputs. There is however no data available so far to determine exactly what is going on.

5.1.3 Absence of Data

In the absence of data available so far, the following difficulties are faced:

- With the execution of civil works additional water has become available but it is not being utilized in a planned manner or there is no evidence as such;
- Lining is being provided at present according to feasibility plans. The project data could help to modify these concepts to improve project benefits; and
- As CWM is a pilot project; it is supposed to provide guidelines for future such projects. Only the data on its performance can help that objective.

5.2 Issues with USAID

There is a general complaint by the SMOs that the USAID procedures for preparation of PILs and the reimbursement of claims are very strict. Specifically, a part of the work done is not payable unless the whole of the work covered by PIL is completed. This results in delays of several months in issuance of PIL and up to years in reimbursements. IDA procedures for similar work are simple. The schemes are cleared readily and reimbursements are also made in time. When the SMOs compare the two procedures, they report that they get frustrated with the USAID procedures.

5.3 Support to Institutional Development

It is noted that there is adequate support to SMO, OFWM, PID and physical improvements of channels and watercourses works but there is little support to farmers on non-water inputs and to Extension Services. Those areas are critical to the program but there is no incentive for them to be active participants.

5.4 Technical Assistance Team (TAT)

The TAT is located in its office at Lahore. COP and four specialists located here are supposed to assist the SMOs in Punjab and NWFP. TAT has provided training to SMO staff, assisted in water measurement and M&E activities, formation of WUAs, and extension services at demonstration plots.

The SOM/Punjab is not pleased with the assistance rendered by the TA Team. According to him, only the Water Management Specialist and the M&E Specialist have been of help to the Punjab sub-projects.

5.5 Lessons and Recommendations

5.5.1 Institutional Development

The SMO is only a coordinating office with no authority over line agencies. Therefore it is not so effective in cases where an agency does not fully cooperate. SMO Punjab has inadequate staff in WM and M&E units. SMO needs strengthening and further support from PPC.

OFWM has direct involvement with farmers through WC improvement while Extension Services have no direct involvement and are only borrowed people. Therefore, their participation is not effective. There should be some Extension Staff with OFWM to do pilot work effectively and then line-agency can take over like other areas.

The PID is supposed to plan, design supervise construction and operate and maintain Irrigation Works as their normal function. In spite of a special circle with a large number of staff exclusively assigned to CWM, the planning and design functions are passed on to Consultants. This is against the concept of institution building and needs to be rectified.

5.5.2 Water Management

Only limited progress has been made in improvement of water management in the sub-project area:

- The TAT was supposed to prepare a water development plan which could be implemented in the sub-project area. None is ready yet;
- Water measurements have started at sub-project sites, but are not used in any plan or scheduling;
- Civil Works and private tubewells have made available extra water which helps to prepare crop water requirement matching plan; and
- PID is willing to participate in water management plan.

The ingredient for an improved water management plan are there and TAT must come up with one soon so that its review, approval, and implementation can take place. A minor or watercourse may be taken up as first effort and then extended to entire sub-project area.

5.5.3 Farmer Participation

Farmers are participating in the water course improvement but then their interest declines. To build up their economic capability to participate on a continued basis, the small farmers must be given credit on easy terms to buy non-water agricultural inputs and the project must also finance the pilot activities on non-water inputs. These subsidies can be withdrawn slowly with increase of farm income.

5.5.4 Increased Agricultural Production

As noted above, water management can be improved, and the agricultural inputs can be increased with sympathetic and realistic attitude towards the farmer and with OFWM taking over Extension Services as well. Increased agricultural production to some extent is already in sight with execution of civil works. This should increase further with improved water management and extension services. To achieve this ultimate goal, concerted efforts by all concerned are needed.

5.5.5 Sustainability

The project activities will naturally diminish with the completion of the project. The project will, however, leave its permanent mark through improvements made.

The SMO is a very important but is a temporary institution only for the life of the project. OFWM is also project-oriented. The others like PID and Extension Services are line-agencies and they will stay in the area. This project has made the farmer realize that line-agencies can also go to him, which is a great step forward.

Since SMO is the focal point, it should continue to exist following completion of the project with limited staff so that the coordination of long-term activities and the interest of the farmers can be maintained.

APPENDIX 4

WARSAK LIFT CANAL SUB-PROJECT SITE VISIT (NWFP PROVINCE)

1. Circumstances of Team Visit

The evaluation mission visited Peshawar and the NWFP sub-project area during August 31-September 2, 1988.

On August 31, the mission met with GONWFP officials, including: Secretary, P&D; Secretary, Irrigation; Additional Secretary, Agriculture; Chief Engineer, Irrigation; Director General, Agricultural Extension; and, Director, OFWM. A project briefing was given at the SMO in the afternoon; this was attended by all members of the SMO and the Evaluation Mission. Later, the mission undertook field visits to the SPA. This provided an early opportunity for informal interaction between the mission and SMO staff.

Accompanied by SMO staff, and representatives of line agencies and the civil works consultants, the mission visited various sites in the SPA, including: the Warsak Lift Canal; a coordinated watercourse; demonstration plots; and, a WUA that is going through a process of motivation before it is given the grant to renovate its watercourse. Detailed discussions were held with large and small farmers in the SPA.

An appointment was also sought with a representative of IDS, but this meeting did not materialize.

The SMO organized a tour program that provided ample opportunity for inspecting civil works, meeting with farmers and holding frank discussions with SMO and other government officials. Both the Project Director and the Deputy Project Director accompanied the Evaluation Mission on all their meetings and field visits; all members of the SMO staff made the mission members feel welcome with their traditional hospitality.

2. Background

2.1 Physical Setting

The NWFP sub-project area consists of lands irrigated by the Warsak Lift Canal. These lands - constituting a gross area of 55,000 acres - used to be irrigated by gravity channels until the late-1960s, when a dam was constructed upstream of the Bara River in order to provide water to the Tribal Areas. The Warsak Lift system was established with a designed discharge capacity of 200 cusecs. The lift pumps are installed within the Tribal Areas, whereas the overwhelming proportion of the command area is in the settled parts of Peshawar District.

Over time, the lift pumps have suffered damage from the silt carried in the water; the canal structures have also suffered from falling debris from rock slides. The canal delivers an annual water supply at watercourse head of 73,000 ac/ft, against estimated crop water requirements of 89,000 ac/ft [World Bank, 1984]. The canal is also subject to frequent closures due to technical problems. There are very few tubewells in the SPA and most of these have been installed in recent years by farmers confronted with unreliable water supplies.

The high cost of lifting water for the Warsak Lift Canal is reflected in high water charges. Farmers drawing water from this canal pay twice the per acre rate paid by farmers elsewhere in the Province. Thus, at the time of preparation of the CWM, GONWFP officials felt that defining ways of using water efficiently will take on a high priority in the Warsak area. Moreover, it was also felt at that stage that the CWM could be a way for solving the problems of the Warsak system. The evaluation mission was told that the Warsak system was proposed for inclusion in the CWM precisely because of the complexity of the problems it had.

The cultivable command area of the Warsak SPA is 43,000 acres, with a cropping intensity of 87 percent estimated at the time of appraisal. The 1981 Population Census reported a population of 69,000 living in 50 villages.

2.2 Socio-economic Circumstances

Part of the SPA is located inside the Tribal Areas. The proximity to both Peshawar and the Tribal Areas has resulted in a diversified livelihood system. While agriculture is the traditional occupation, consisting of small-scale farming and transhumance, trade and commerce appear to play a leading role in providing cash incomes and employment. A brisk trade in contraband goods takes place in and around the SPA, and this occasionally leads to crime within the SPA. (One of the engineers of the supervisory consultants was deprived of his jeep at gunpoint while on a site inspection shortly prior to the evaluation team's visit.)

More than 90 percent of the farms are less than 12.5 acres in size; these farms average 3.5 acres, and belong mostly to owners or owners-cum-tenants. Most of the output from these farms is for household consumption. Large farms, less than 2 percent of the total, comprise 13 percent of the cultivated area; many of the large farms are owned by khans (clan leaders). The khans are influential in the jirga (council of elders) as mediators of disputes on land, water, and other community matters.

2.3 Civil Works Goals

Under the IBRD/IDA component of the project, rehabilitation of the Warsak Lift Canal entails improvement of masonry as well as the earthen portions of the canals. The project also calls for lining 10 miles of minors and distributaries, and remodelling 150 outlets.

The USAID (OFWM) component requires the renovation of 100 watercourses, including 15 percent cement-brick lining. The lining target translates into 304,000 ft (58 miles) of lining.

The lining of canal reaches is expected to save 2,500 ac/ft of water; renovation of 100 watercourses is expected to save another 18,100 ac/ft. [World Bank, 1984].

2.4 Non-civil Works Goals

Each renovated watercourse is expected to have a WUA, for an SPA total of 100 WUAs. Similarly, the project calls for one demonstration plot per renovated watercourse as part of the OFWM component. The last element of OFWM is precision land levelling on 2,000 acres over the life of the project.

The project requires considerable attention to improved inter-agency coordination and farmer participation in order to provide farmers with timely and reliable supplies and services in the non-water sectors.

As a result of the civil works and the non-civil works inputs, the project appraisal estimated that with-project cropping intensities would be 26 percent higher than without-project cropping intensity in the SPA; and that yields per acre would be 30 percent higher for maize, 50 percent higher for wheat and 35 percent higher for sugarcane. It was also estimated that the project would increase per capita farm incomes by 33 percent. Overall, the Warsak sub-project is expected to have a rate of return to investment of 17 percent, just about the second-lowest among the seven sub-projects (higher than Las Bela's and one point higher than that of 6-R).

2.5 Organizational Issues

In NWFP, the lead agency for the project is the Irrigation Department, whose Superintending Engineer, Central Irrigation Circle, Peshawar, is the ex officio part-time Project Manager. Staff have also been deputed to the SMO by the Agriculture Department. There have been problems of cooperation between Irrigation and Agriculture Departments in their work within the SMO. GONWFP has indicated that the Irrigation Department will be the preferred lead agency if there is a second phase of CWM.

The sub-project has been operating with an ex officio Deputy Project Manager; the sub-project has seen three Deputy Project Managers so far. The role of the Deputy was assigned, until recently, to the Executive Engineer,

Warsak, of the Irrigation Department. The present Deputy is from the OFWM Directorate of the Department of Agriculture. Although a proposal has been submitted to the NWFP Finance Department for a full-time position for the Deputy Project Manager, the position has not yet been formally approved. As of now, most decision-making appears to be vested in the part-time Project Manager, while delegation of financial and administrative control to the full-time Deputy Project Manager is pending.

3. Project Activities

3.1 Sub-project Management Office (SMO)

The SPM is new to the CWM project, although he has had previous experience with the ISM project. He devotes 20 percent of his time to CWM, since he is concurrently active in other Irrigation Department duties. The SPM appears as a kind and reflective gentleman, with the capacity to command respect and impose discipline on an office whose work in the past has suffered from internal divisions.

The NWFP sub-project currently has a staff strength of 47, broken down as follows:

- Project Directorate 9
(SPM, XEN and support staff)**
- Water Management Unit 5
(Water Scheduling Specialist, Computer Programmer, Sociologist, and 2 Enumerators-Accountants)**
- Planning, Monitoring and Evaluation Unit 9
(Ag. Economist, 2 Enumerators-Accountants, 2 Surveyors, and support staff)**
- One Field Team 24
(Asst. Dir. Water Management, Water Management Officer, Water Management Extn. Spclst., 4 Sub-Engineers, 8 Rodmen, 2 Field Assistants, and support staff)**

The Water Scheduling Specialist of the Water Management Unit has been nominated as the new, full-time Deputy Project Manager.

This was the first sub-project to recruit a WUADS. In addition, a sub-inspector from the Cooperatives Department was posted to the SMO for four months; since his departure, no successor has been appointed.

SMO staff have the required technical expertise in civil works. It is difficult to assess staff capabilities in other fields, since the SMO has been engaged in very little work outside the domain of irrigation civil works. Nevertheless, there appear to be individuals present in the SMO who could begin to address some of the non-civil works components of the project, particularly water management and WUA activities. The PME Unit, however, is weak and lacks direction.

No item of staff training is listed in the briefing paper given to the Evaluation Mission by the SMO.

There are no women on the staff of the SMO, and this might be one factor explaining the continuing lack of attention to income-generating or labor-saving programs for women.

3.2 Relations with other relevant agencies

The sub-project has been able to coordinate with the Cooperatives Department as well as the Fauji Fertilizer Company. The Cooperatives Department posted a sub-inspector for four months to the SMO, through which he reportedly organized 10 cooperatives; no successor has been appointed since his departure. The Faujis have put down demonstration plots.

3.3 Civil Works

Sub-project civil works goals are summarized below.

Civil Works Targets (to FY 88) and Achievements

	<u>Target</u>	<u>Achv.</u>
1. Canal Rehabilitation and Remodelling:		
(a) canal rehabilitation (ft.)	800	1,582
(b) minor lining (mi.)	10	15.5
(c) outlet remodelling (no.)	120	
(d) improvement of canal structures (Warsak) (%)	151	0
2. On Farm Water Management:		
(a) watercourse renovation (no.)	100	30
(b) demonstration plots	100	5
(c) precision land levelling (acres)	200	0

3.3.1 Sub-project Activities

The sub-project has begun rehabilitation work and lining on the Warsak Lift Canal. Lining has been completed on 10 miles, and some canal covering has also been installed; additional work includes remodelling of distributor, and the provision of one escape. Outlet remodelling has not yet been done. Watercourse renovation has been completed on 30 watercourses.

Continuing problems with the manufacture/procurement of lift pumps mean that farmers face an over-riding water availability problem. Until adequate water is available, it would be difficult to nurture and sustain farmer interest in a productive agriculture. Thus, the delayed arrival of lift pumps is the highest priority problem facing SMO staff and farmers in the sub-project area. There are also problems in controlling water availability (and making engineering changes) in long blind runs through the Tribal Area. Moreover, watercourses in the SPA may have very deep cuts which often collapse, making O&M especially difficult.

The quality of canal lining is inadequate. In particular, the joints have not been filled correctly, and there are cracks along the sides of the canals. In addition, a leaner mixture of cement and sand was used than is permissible under project guidelines.

3.3.2 "Percentages of Lining" and "Critical Areas" Issues

SMO staff in the NWFP are confronted with the issue of how best to respond to the varying topology of the SPA in designing watercourse renovation. Given the location-specific nature of the issue, the 'fixed 15 percent' rule imposes an additional and probably unnecessary constraint on project effectiveness, since funds are available to increase the lining percentage. There is reported to be provisional USAID agreement to increase the lining percentage for NWFP, but the final approval has not yet been given.

3.4 Non-civil Works

Work in the NWFP sub-project area has been dominated by the lift pumps issue and the lining of the canal and watercourses. By and large, SMO staff and cooperating line agencies convey the feeling that non-civil works activities have to follow the completion of the civil works. If this logic of sequential intervention (civil works followed by everything else) is maintained, the NWFP sub-project may lose the opportunity of initiating a number of institution-building and extension activities that can be started even now with the staff and resources available to the SMO.

3.4.1 WUA Formation

The NWFP SMO has registered 50 WUAs. The WUAs have been employed most visibly in the renovation of watercourses (30 completed).

The SMO's WUA program has benefitted from the short presence of a Cooperatives Department sub-inspector, who is reported to have organized 10 cooperatives during his tenure; four of these cooperatives are currently reported to be active. The SMO has also benefitted from the early presence on its staff of a WUADS. The WUADS works most actively with one coordinated watercourse, two credit cooperatives, and one WUA that is being motivated and organized prior to renovation work on its watercourse.

Notwithstanding this progress, however, WUA formation in NWFP has been constrained as have the other SPAs, by various problems. Most noticeably in the NWFP, farmer enthusiasm for participation in project activities has suffered because of the lack of a reliable water supply in the Warsak Lift Canal.

The sub-project has invested considerable time and effort in experimenting with farmer organization. The five credit cooperatives formed are, however, centered around small parts of the WUAs - most WUA members are left out, some of them presumably because they feel that they do not need the cooperative, others because of their suspicion of such efforts.

The sub-project has experimented with various approaches to farmer organization. However, there is virtually no documentation on the success or failure of these efforts. There is one coordinated watercourse in the SPA; all cooperating line agencies are supposed to provide intensive inputs to the WUA on this watercourse. One would expect, therefore, that the WUA would, in some sense, be a model for other WUAs. A visit to this watercourse, however, proved to be one of the low points of the evaluation team's trip to NWFP: many farmers and children had come to the WUA meeting because they had been told that some foreigners would be coming to the village; in a short time, most villagers lost interest in any discussion of development activities; the tea and refreshments that were served soon became the activity of greatest concern to most of the participants; the evaluation team could not find more than three villagers who could explain the uses of cooperative credit obtained by them with the help of the project; nor was the WUADS aware of the social and economic dimensions of the WUA's loan. The evaluation team had been told at the SMO prior to their visit to this watercourse that it was located in a progressive area with few problems. If that is correct, and if the coordinated watercourse is the focus of intense activity by several agencies, the payoff to the project's efforts must be considered very small in comparison with the potential of the area and the resources expended by the project.

Although attempts have been made to provide credit to the WUAs, the WUAs are not linked effectively with other non-civil works activities envisaged in the project. Part of the reason may be that the SMO has not held SCC meetings in the project area: the meetings have been held in the SMO, and WUA representatives are expected to travel to Peshawar for participation. Nor do SCC meetings appear to be advertised in advance among WUAs. The SMO's current approach restricts farmer access to line agencies, and there is little systematic articulation of farmer needs and problems to which the SMO and line agencies could respond.

The sub-project has a program of demonstration plots, accompanied by farmer days for observation and discussion of results. While the demonstration itself is usually on the land of a large farmer, farmer days are expected to provide the opportunity to all farmers to acquire information on improved technology. The sub-project has not conducted any impact assessments of its farmer days to document how many farmers attend

these events and whether this participation has influenced their farming methods. The TA Team maintains that farmer days serve to promote the project's participatory objectives; there is no evidence yet in support of this claim, since not even farmer attendance - not to mention impact - has been recorded.

There also is a new initiative being inaugurated in NWFP which may merit special attention. The sub-project is experimenting with a new approach to WUA organization that entails a period of explanation and motivation prior to the renovation of a watercourse. WUA members meet several times as a group to discuss their plans and priorities; the WUADs explains the requirements for registration and active participation. This approach has the potential to lay the foundations of an effective organization along the watercourse. The process needs to be documented carefully; if it appears effective, its extension to the whole SPA should be actively explored. This appears to be a good example of the kind of experimentation which CWM was designed to encourage.

3.4.2 Extension Services

The sub-project has approval in the PC-I for 100 demonstration plots over five years; the cost of these plots is to be met from the project budget for watercourse renovation, i.e., the budget is part of the unit cost of watercourse renovation.

During 1986-87, the sub-project put down 5 demonstration plots; another 6 (including 3 for precision land levelling) were established during 1988, while 19 are planned for rabi 1988-89. The Fauji Fertilizer Company has also established 5 plots in the SPA this year. The plots are for wheat and maize (sorghum was planted on at least one PLL plot). Pak-81 variety is recommended for wheat, and Azam for maize. The fertilizer recommendation for wheat is 2 bags per acre of di-ammonium phosphate and 2 of urea; the Fauji plots add 1 bag per acre of sulfate of potash. Fields neighboring the demonstration plots are taken as control plots. farmer days are organized around demonstration plots, and a brief note is written by PME staff on the events of the day.

Following a suggestion by the USAID Project Officer, the sub-project separates its PLL demonstrations from its agricultural ones. This is a commendable step, in that it allows farmers and extension agents to observe and evaluate the two sets of technologies separately. No other province so far has followed this approach.

A major constraint confronting extension activities in the SPA is that unreliable water supplies are preventing the full-fledged development of an extension program. The program of demonstration plots, for instance, has been confined to those (usually large) farms that have access to tubewell water. This constrains both extension effort and farmer response.

In a related view, there appears to be no systematic summary of results from the demonstration plots. Notes maintained by an Agriculture Officer show some yield data; as expected, yields are higher on the demonstration plots than on control plots. Notes maintained by the PME unit on farmer days are narrative descriptions, more of the process of socializing than of farmer participation in the demonstration of new technology: these notes provide no monitoring information on farmer response and concerns. One gets no sense of what the demonstration plots are accomplishing.

The extension methodology used by the NWFP sub-project is that of promoting a package of new technology consisting, simultaneously, of several elements. There is empirical evidence from Pakistan and elsewhere that farmers adopt innovations one at a time, in a sequence, rather than as a package; this has to do with the learning and capital costs of innovation adoption. The approach taken in the sub-project puts an unrealistic burden on resource-poor farmers with little formal education and only sporadic contact with extension agents. Too, there is no statistical methodology for documenting and analyzing the results of the demonstrations. Indeed, the extension and statistical methodologies used fail to demonstrate the project's potential for technology transfer.

As is often the case with demonstration plots, the new technology has been demonstrated on land provided by large farmers, who can bear the risk of experimentation. Unless efforts are made to effectively communicate any positive findings to small farmers, the demonstration program may lead to increased disparity. In other words, the demonstration plots program needs an innovative communications approach in order to reach the

small farmers. The expectation that farmer days provide such an approach for small farmers needs to be examined with quantitative follow-up data on farmer response and patterns of technology adoption.

Notwithstanding the foregoing, the NWFP SMO and TA Team counterparts have made a promising beginning by: (a) identifying which crops to work with; and, (b) involving extension staff and the Fauji Fertilizer Corporation in the demonstration plots program. These efforts can have a much higher payoff than now if: (a) demonstration plots demonstrate only those one or two technologies that have a good chance of being adopted by farmers in the next season; (b) solid documentation is maintained for demonstration and control plots for both monitoring and eventual extension purposes; (c) any positive results are communicated by means of farmer days, audio-visual techniques and extension leaflets to the largest possible number of farmers; and, (d) supplies and services are organized around those technologies that have already captured the attention of most of the farmers.

In addition to wheat and maize, there would appear to be promising opportunities for improved varieties and good quality seed of vegetable and fodder. Women and small farmers could benefit greatly from improvements in vegetable and fodder productivity.

More generally, the SPA's farming systems could be analyzed quickly and comprehensively with the aid of literature review and a rapid appraisal exercise conducted jointly by agricultural and social scientists. Numerous agro-economics reports have been published by the joint PARC-CIMMYT research program. These include some pioneering work on the identification of farmer priorities in maize-wheat areas in the NWFP, as well as analyses of other crops and technologies. A rapid appraisal exercise (with the possible involvement of trained staff at the Agricultural Research Institute, Tarnab, and the Cereal Crops Research Institute, Pir Sabak) could be directed at broad sets of farming activity, such as cereals, vegetable, and livestock and fodder. One function of this exercise would be to identify specific opportunities for small farmers and women, who have not yet received specific attention from the project. While there may be opportunities for the project to improve the productivity of agricultural activities undertaken by women, these are not likely to be identified or addressed unless women professionals are involved in selected elements of the analysis of the farming systems. One source of assistance with women's programs may be the USAID-funded MART project working on farming systems issues in the barani areas of Punjab.

The SMO may find it possible to experiment with farmer training in a small number of fields, such as livestock disease control, plant protection, and improved fodder (for women). This kind of training is a useful complement to extension efforts by government departments, provided WUAs can be persuaded to select and support appropriate farmers on a continuing basis. Men's training can be organized with the collaboration of the Extension Department at a central location in the SPA; women's training will need female staff that is mobile, since most women cannot be expected to come to a central location away from their villages.

3.4.3 Improved Water Management: Precision Land Levelling

Precision land levelling (PLL) was undertaken on three plots offered by large farmers. The plots were established by the OFWM Directorate, which provided staff and equipment.

While good levelling may well have an economic payoff under existing technology and incentives, and many farmers may be practicing it, the payoff to precision levelling is questionable, particularly in view of its high cost. PLL entails not only the cost of machinery for precision levelling, but also, in some cases, the cost of late or no planting on land that is being levelled.

Although precision levelling remains (perhaps prohibitively) expensive, farmers in Pakistan are already paying attention to good levelling. Thus, an important challenge is to: (a) understand why some farmers find it beneficial to level their fields more carefully than others; (b) identify the larger set of farmers who might benefit similarly from improved levelling; and, (c) clearly demonstrate/communicate the benefits of improved levelling.

3.4.4 Improved Water Management: Matching Crop Water Requirements with Available Water

The XEN Irrigation is working with the TAT Water Management Specialist to develop a water management plan. The TAT is preparing a computer model for matching available water with crop water requirements. This model may well have an analytical role in understanding farmer choices, but its suitability as a source of farmer recommendations is questionable: what is optimal in a model may not be optimal for practicing farmers, since a model cannot be expected to replicate farmer objectives and resources with any great accuracy. Given the structure of household and market demand, and the farmer's considerable experience with water and other inputs currently being used, the farmer could be expected to respond adequately to changing levels of water availability; computer modelling, based on a partial understanding of the farmer's resources and priorities, is unlikely to improve upon the farmer's choices. While modelling can help illustrate the broad directions of farmer response to technological innovation, investing scarce project resources to devise farmer recommendations on the allocation of resources under a technology that is well-known to the farmers is probably a low-payoff activity for project management.

Once the civil works program in the NWFP SPA is completed, perhaps overall availability of water may not be a binding constraint at all times of the year. If this is correct, then project management would need to focus its efforts more narrowly on interventions such as those that: (a) help farmers overcome peak season water constraints; (b) exploit interactions between water and other water-sensitive inputs such as fertilizer, improved varieties, etc.; and, (c) identify water saving technology appropriate for the SPA and advise farmers on the use of this technology.

Current water management plans seem driven by the biological requirements of crops, rather than the economic and social concerns of farmers. There is no systematic documentation on farmer irrigation practices that the project is supposed to improve upon. Basic information collected through a rapid appraisal might yield insights into farmer priorities, knowledge and resources as they are reflected in cropping patterns, land preparation, variety choice, irrigation practice, labor allocation, seed rate, fertilizer application, etc. Such a diagnostic exercise might lead to the identification of profitable technological interventions for farmers to choose from, given the farmer's view of his markets and resources.

The preceding approach puts a premium on inter-disciplinary work within the TA Team and the SMO, and between the TA Team and the SMO. None of this seems to have been attempted so far in any systematic manner.

3.4.5 Credit

Loans were arranged for two cooperative societies, which repaid the loans on time, thus making them eligible for the standard 4.5 percent rebate for timely repayments. These cooperatives are drawn from two WUAs that have a total membership of 184; 40 of these members are in the cooperatives, of whom 30 applied for credit and 25 were actually given the loans. Three members received Rs 20,000 each, while others obtained Rs 10,000 each.

The SMO reports that it also assisted several farmers obtain individual loans from banks. Three members of a WUA were helped in obtaining a tractor loan from ADBP, and letters were written on their behalf by the SMO to the Ministry of Production for quick delivery of the tractor.

There are factors, however, which constrain credit operations in an important way. Banks follow policies and procedures that are determined at a national level, either by their head offices or by the State Bank and the Pakistan Banking Council. A small project with limited influence and resources cannot be expected to change such policies. For instance, banks will lend only to credit-worthy individuals, not to groups of farmers. Similarly, zonal and local targets for agricultural loans are determined on an annual basis by the head offices of banks. Even if farmers get to learn the detailed procedures to be followed for loan applications, very few farmers will be able to get better access to a more-or-less fixed pool of subsidized credit. The project can, at best, assist a handful of credit-worthy individuals (usually large farmers) by playing an advocacy role with local branches of banks. It is highly questionable if such activities constitute a cost-effective and equitable deployment of CWM resources.

The dilemma for the SMO, the TA Team and A.I.D. project staff is that greater farmer access to credit is one of the important elements of project design, but one for which the national policy environment was not recognized as a constraint at the design stage. Thus, project staff in pursuit of a desirable objective have expended considerable time and effort discovering constraints that should have been obvious at the time of project design.

Even with the best of its efforts - including considerable time invested by the SMO, the TA Team and USAID - only two cooperatives out of the 25 WUAs organized so far managed to get any short-term group credit; only 25 out of the 184 members of the two WUAs secured these loans; only 3 influential farmers obtained long-term development loans as individuals. The disbursement of cooperative loans was delayed into the crop season. It is reported by the SMO that such loans are not likely to be obtained for the current year, since there has been a policy change for short-term agricultural production loans.

3.4.6 Special Activities

Some agricultural inputs are probably being supplied adequately by private sector dealers, commission agents and landlords; very often, the farmer can obtain inputs on credit from such sources.

Thus, large numbers of farmers may be receiving credit and inputs as a package from the same source. From the farmer's point of view, this arrangement could be improved upon if cheaper credit were available, or if inputs were available on time and in the required amounts. For reasons noted earlier, the project cannot obtain cheap credit for large numbers of farmers. At the same time, input supplying companies often cite national-level bottlenecks as the reason for shortage or delayed availability of inputs. The project can have only marginal impact on alleviating the shortage of inputs at the national level.

The SMO and TA Team need to identify a very small number of critical inputs whose supply can be organized or influenced significantly by the SMO. There may be a high payoff to improved distribution of certified seed. Part of the seed requirements may be met in collaboration with public sector agencies and research institutes, while part of it may be generated within the SPA through a program of establishing seed farmers; the objective should be good seed, not necessarily certified seed, that can be distributed throughout the SPA.

For fertilizer supply, the SMO could assist strategically-located WUAs obtain dealerships from various fertilizer companies; such dealerships are available at points along paved roads. Extreme caution needs to be exercised, however, that the dealer-WUAs do not turn into the personal businesses of their Chairmen, for that would be inconsistent with the project's participatory objectives and would merely channel project resources to a few influential individuals. WUAs should be selected for project support from among those that have a sizable and relatively homogeneous membership, and they should first explain how their members plan to share the costs and benefits of the enterprise.

Arrangements could also be made with the Agriculture Department to organize spray campaigns at critical periods for one or two selected crops. If the Department is willing, the project could organize farmer training in collaboration with the Department, and trained farmers (remunerated by WUAs) could assist Department staff during spray campaigns. The incidence of pests and diseases on maize and fruit offers an opportunity for coordinated action to reduce losses to the farmers.

There are numerous other ways in which farmer groups in Pakistan have been assisted by irrigation and agricultural development projects. The project staff may find it valuable to establish a regular program of visits for concerned specialists to especially interesting projects.

4. Institutional Development Issues

4.1 Monitoring and Evaluation

4.1.1 Organizational Arrangements

The PME Unit is headed by an Agricultural Economist and includes: 2 Enumerators-Accountants, 1 book-keeper-cum-stenotypist, 2 surveyors, 2 drivers and 1 naib qasid. The list of vehicles provided by the SMO indicates that the PME Unit has no full-time vehicle assigned to it: one four-wheel drive pick-up for PME is shared with water management and other SMO staff.

There is little demand within the SMO for effective M&E. There is no plan, and very little thought seems to have gone into how to carry out M&E activities to assess impact or inform decision-making within the SMO and the line agencies.

4.1.2 Data Collection/Generation Issues

The baseline survey for the SPA has been contracted out to the Institute of Development Studies of the University of Peshawar. The data are reported to have been collected, and the report is expected by October 1988. The Evaluation Mission was not able to secure a meeting with any representative from IDS, and the current status of work could not be ascertained first-hand.

It is reported that the PME Unit, in collaboration with the TA Team, has collected the following information:

- credit and land use data on the coordinated watercourse;
- discharge measurements on 6 watercourses;
- information on 4 watercourses at the tail of the canal to assess the impact of canal lining;
- data on 5 watercourses to assess the impact of watercourse renovation, credit and extension; and,
- continuing data collection on extension activities.

Some of this information was available in a sketchy form in a register maintained by the PME Unit; much of it, however, could not be found at the SMO at the time of the Evaluation Mission's visit. An inspection of data available at the SMO indicated that much of the effort that has been put into data collection appears to be incomplete and unsystematic, and suffers from quality problems. By and large, the data are of extremely limited value for assessing impact or informing decision-making at the SMO level. There is also no monitoring and evaluation of the project's impact on women and different classes of rural society. Virtually no information has been recorded on the activities of the WUAs or the social dynamics: there is little appreciation that WUAs represent an important and interesting experiment in social organization and infrastructure management.

4.1.3 Data Analysis Issues

No reports have been prepared so far on any data from the NWFP SPA. The TA Team based in Lahore is working to analyze the data from five watercourses on the impact of watercourse renovation, credit and extension. The SMO's PME staff appeared to be unaware of the issues and methodology for data analysis.

4.1.4 General M&E Issues

It appears that the NWFP sub-project equates the M&E function with the project's need to monitor civil works and their impact. As a result, project staff give the impression that inadequacies and delays in M&E are linked to delays in the implementation of civil works.

The whole question of M&E needs to be thought through jointly by the SMO and the TA Team, with particular attention to:

- continuous monitoring and impact assessment along the lines of the End-of-Project status (EOPS) indicators listed in the A.I.D. Project Paper;**
- the documentation and analysis of project successes that can be extended to a larger portion of the SPA;**
- the documentation and analysis of project limitations and failures that imply the need for course corrections by project management;**
- appropriate methodologies for the preceding, including those methodologies that require close interaction in the field between SMO staff, TA Team and the villagers;**
- the kind of staff that is needed, either at the SMO or as short-term local consultants, for the preceding efforts;**
- the kind of support that could be provided by the TA Team, such as assistance with methodology, networking with national resource bases, identification of computer equipment and software, etc; and,**
- the frequency and form with which M&E results need to be disseminated to the various clients - SMO, donors, villagers.**

4.2 Sub-project Coordinating Committees

The NWFP SCC is headed by the SPM and includes: XEN, Warsak Canals Division; Deputy Director, OFWM; Director (Operations), Agricultural Development Authority; Regional Manager, ADBP; Deputy Registrar, Cooperatives; EADA, Agricultural Extension; civil works consultants; and Chairmen of the WUAs.

The SCC has never met in the project area with the farmers; it meets, instead, at the SMO, and these meetings are sometimes attended by interested WUA Chairmen. There is, therefore, little organized activity for interaction between farmers and line agency personnel: there is no forum through which line agencies, banks, etc. could explain their programs to farmers, and farmers could explain their needs and problems to officials. Only so-called 'progressive farmers' with specific interests appear to have taken the initiative of coming to SCC meetings when they were first started; farmer participation since then has declined to very little or none. The SCC meetings also appear to be scheduled with longer gaps: the last one reportedly took place over three months ago because project staff were said to be busy with year-end activities.

In general, the SCC in NWFP is, at best, a meeting of government officials. It is not fulfilling its mandate to make government more accessible to farmers.

4.3 Provincial Policy Committees

The PPC is chaired by the Secretary, P&D, and includes the Secretaries of Agriculture, Irrigation and Finance, as well as P&D's Chief of the Water and Power Section as Secretary to the PPC. The PPC has been instrumental in resolving inter-agency issues, as well as securing staff for the CWM.

5. General Issues

5.1 Issues of Farmer Contributions

The whole issue of farmer contributions to watercourse renovation needs to be examined empirically in terms of its effect on the project's cost-recovery and participatory objectives. Since the issue is general, it is discussed in detail in the main report.

5.2 USAID Contract Issues

The perception of GONWFP is that the time taken by USAID to process the PILs is too long. This perception results apparently from a comparison of USAID procedures with those of other donors.

5.3 Consultancy Services

The TA Team based in Lahore assists the NWFP sub-project staff. All four specialists from the TA Team have worked with their counterparts at the SMO, and their efforts have been appreciated.

The specific contributions of the TA Team to the NWFP SPA are noted above in the sections on various project components. These contributions took place in an environment in which the important civil works component of the project not only dominated the project but was also plagued by continuing problems that undermined farmer confidence in the project. At the same time, the potential for building farmer confidence through development of non-water inputs has not been exploited by the project; part of the explanation for this omission is due to the approach taken by the TA Team in interpreting its scope of work.

The TA Team has insisted that its role is that of advisors to the SMO; this is also the perception of government officers in NWFP. According to the TA Team, its advisory role has two implications: that it should not be called upon to implement project activities; and that, where there are no counterparts or adequate staff in the SMO, there is little for the TA Team to contribute. Since a project competing for staff resources with several agencies is bound to confront staffing problems, and since the distinction between advice and implementation is often unclear, two kinds of practical issues arise out of the TA Team's definition of its functions.

The first practical issue is whether and to what extent should the TA Team pursue project objectives in the short period available to it, regardless of the presence of suitable SMO staff. The TA Team's insistence on appropriate SMO staffing as a pre-condition for effective TA input may well be soundly-based upon one interpretation of the TA contract. On another interpretation, however, the Team's approach could be a sign of its lack of commitment to project objectives: if government staff are not available on time, the TA Team's staff would not be made available either.

The second practical issue concerns the ambivalent way in which the TA Team's approach is translated into assistance to SMO staff. While some TAT members give the impression of awaiting the arrival of appropriate SMO staff, others have taken a more objectives-oriented approach: some lead from behind and others lead from the front. Thus, some project components (e.g. demonstration plots and PME) are spread far and wide with the active assistance of TAT members, while others (such as crop-water interactions and WUA support) proceed at a pace that is inadequate with respect to the project's current needs.

5.4 Recommendations

There is a need to harmonize the TA Team's approach with the requirements and realities of the project. Clearly, the TAT contract is one of these realities, but project objectives and the quality and number of staff at the SMO are additional realities that need to be accommodated if the project is to accomplish its goals.

The challenges faced by the NWFP SPA are noted in detail in the preceding pages. While the tasks are complex, there are also opportunities for the TA Team to provide leadership in defining the strategy for those program elements that are not yet articulated or operationalized. The TA Team has so far made a limited contribution to strategic planning; in the future, it has a substantial opportunity to do so in a shorter period of time.

Warsak Background Statistics

Population (000) - 1981 census	69
Number of Villages	50
Gross Area (000 acres)	55
Command Area (000 acres)	43
Water Available (000 ac/ft annually) at Watercourse Head:	
- canals	73
- public tubewells	
- private tubewells	
- Total	73
Crop Water Required (000 ac/ft annually) at Watercourse Head	89
Average Crop Yields, FY81, kg/ac:	
- kharif Maize	330
Sugarcane	9,140
Fodder	5,480
- rabi Wheat	530
Fodder	16,880
Estimated Incremental Cropping Intensity (%):	
- present (P)	87
- future, without project (w)	87
- future, with project (W)	110
- increment W over w (%)	26
- increment W over P (%)	26
Projected Net Farm Income (000 Rs) Per Capita:	
- present	0.6
- future, without project	0.6
- future, with project	0.8
- increment with over without project (%)	33

Source: World Bank, Staff Appraisal Report: Pakistan. Command Water Management. April 1984.

APPENDIX 5

LIST OF KEY PERSONS INTERVIEWED

1. GOP PERSONNEL

Maj. Gen. Agha Manzoor Rauf, Addl. Secretary, Min.W&P - Islamabad

Dr. S. Masood Ali, Joint Secretary (Water)/Federal Coordinator, Min. W&P Islamabad

2. PROVINCIAL GOVERNMENT AND PROJECT PERSONNEL

A. Bauchistan Province

Abdur Raziq Khan, Secretary PID - Quetta
Salim Murtaza, Secretary Agriculture - Quetta
Ata Muhammad Jafar, Addl. Ch. Secretary (Dev)
Muhammad Yousaf Niazi, Secretary Finance
M. A. Rasheed, Chief of Section (Water)
Chaudari Zulfiqar Ali, Director General
Mohammad Bashir Khawaja, Sub-project Manager
M. Haroon Ahmed, DC Lasbela
M. Anver Qureshi, M&E Specialist
M. Naeem Balouch, SDO (Irrig.)/A.E. Construction
Mohammad Hashim, SDO (Irrig.)
Bashir Gilzai, Assistant Director (OFWM)
Naeem Balouch, SDO (Irrig.)/A.E. Construction
Mohammad Hashim, SDO (Irrig.)
Mohammad Anwar, Agriculture Officer, OFWM
Afzal Raisani, Agricultural Officer
Bashir Ahmed Khetani, Assistant Director, Ag. Ext.
Mohammad Din, SDO (O&M)

B. Sind Province

Muzammil Hussain Qureshi, Secretary PID - Karachi
Syed Azizuddin, Chief Economist, Sind P&D
Munir Ahmad Qazi, Chief Ag., Sind P&D
Mohammad Idrees Rajput, Addl Secretary, I&P
Shaukat Usman, Addl Secy, Agriculture Dept
M. Suleman Rajpat, Xen, Rohri Canal Div. Moro
Azizullah Tunio, Sub-project Manager
Aftab Ahmed Qureshi, Deputy Director (M&E)
Naushad Ali Jamali, Deputy Director (WM)
Naushad Ali Memon, Asst. Exec. Engr. Sehra System
Altaf Hussain Soomro, Asst. Exec. Engr. Naulakhi System

C. Punjab Province

Mohammad Aslam Choha, Secretary, PID - Lahore
Zafar Altaf, Secretary Agriculture - Lahore
Zaka Uddin, Chief/Water, P&D - Lahore
Mohammad Saleem Arshad, Sub-project Manager
Mohammad Sadiq Cheema, Director General, OFWM

C. Supervisory Consultants

Col. S. Hasnain Ahmed, NDC-NESPAK - Islamabad
Amanul Haq Enver, Project Engr. NDC-NESPAK Lasbela
Saeed Qureshi, Junior Engr. NDC-NESPAK Lasbela
Mohammad Hayat Baloch, Field Engr. NDC-NESPAK Sind
Faiz-ul-Hassan, ACE, TLO, - Islamabad
M. Bachel Memon, Fld. Engr. ACE-ZCL Sind/Baluchistan)
Rashid Beg Akhtar, Project Manager, ACE-ZCL-Lahore
Ch. Mohammad Akbar, FE, NDC-NESPAK

D. PRRI, Lahore

Mazhar-ul-Haq Baluch, Research Economist,
Punjab Economic Research Institute (PERI), P&D Department, Punjab
Habibur Rahman, Senior Research Economist, PERI

E. SRPO, Karachi

Soomro, Director SRPO

4. DONOR ORGANIZATIONS

A. USAID/Islamabad

Jim Norris, Director, Pakistan
Pat Peterson, Chief, ARD
Dick Goldman, Deputy Chief, ARD
Alvin P. Newman, Chief WRD/ARD
John H. Foser, Project Officer
Zahid S. Khan, Project Engineer
S.Asif Mahmood, Project Engineer
Tariq Mahmood, Program Assist.
Peter Davis, Chief, PRO
Mohammad Ashto
Jalil U. Ahmad, ISM Project Officer
Gerry Anderson, PDM

B. IDA/IBRD

Usman Qamar, Project Advisor, World Bank Islamabad

5. OTHERS

Denny Hamilton, TPM Facilitator - Bangkok
James M. Wolf, IIMI - Lahore
Andrew Stone, IIMI - Lahore
Tony Garvey, ISPAN, - Washington, D.C.

APPENDIX 6
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3. Punjab Province

a. General

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d. 6R - Hakra Sub-project

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e. Pakpattan Sub-project

4. Northwest Frontier Province - Warsak Lift Sub-project

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APPENDIX 7

TECHNICAL ASSISTANCE TEAM SOW

Systems Management Specialist/Team Leader

This advisor shall be the Contractor's Chief of Party (COP) with the authority to make day-to-day policy, programmatic and administrative decisions on behalf of the Contractor.

This advisor will primarily be an irrigation system management specialist with experience in the administrative water delivery responsibilities of managing an irrigation system. Experience is also required in planning and implementing the civil works. A primary responsibility will be advising the CWM Sub-Project Managers in carrying out planning and management functions. This person shall coordinate and schedule team members' activities, which will require, *inter alia*, direct contact with each of the Sub-Project Managers, members of each Provincial Policy Committee, appropriate administrators in the Federal Government, USAID and the IBRD. In short, this person will be the major facilitator and linchpin on the Contractor's team in meeting CWM Program objectives.

The advisor will advise and provide technical assistance on the overall aspects of preparing operational plans and analyses for each sub-project area. The operational plan will cover redesign, rehabilitation and improvement of the watercourse irrigation system including on-farm water management, conjunctive use of surface and ground water, and timely provision of other off-farm inputs and services, i.e., credit, fertilizer, marketing, etc., necessary to increase agricultural production or reduce production costs. On an "as needed basis" the advisor shall provide technical advisory assistance on a full range of planning, administrative and management activities including system's operation, water scheduling and system maintenance.

More specifically, this advisor, in collaboration with Sub-Project Managers, the OFWM Directorates, local supervisory Consultants and other Provincial and Federal level individuals and organizations shall:

- Investigate ways to strengthen the organizational structures at the sub-project level;
- Within 90 days of his arrival in Pakistan, complete a review of the master Work Plan with the assistance of short-term TDY and in collaboration with GOP and USAID officials, to determine if modifications are necessary and revise the plan accordingly. On an annual basis thereafter, the advisor shall in collaboration with GOP and USAID officials, review progress in achieving objectives as provided in the Work Plan and revise it accordingly;
- In conjunction with reviewing and updating the Master Work Plan, prepare and submit for USAID and GOP approval an annual work plan for each long-term advisor. The initial work plan for each advisor shall be due within 90 days of that advisor's arrival in- country;
- Submit for USAID and GOP approval short-term technical assistance requirements as identified and prepare and submit scopes of work and resumes for USAID and GOP approval prior to inviting individual consultants to visit the sub-project sites;
- Participate informal and on-the-job training on an as needed basis;
- Hold regular, but not less than bi-monthly, meetings with the local supervisory consultants to ensure coordination between physical and institutional improvements;
- Meet regularly with sub-project managers to develop and review progress in implementing the operational plans for each sub-project area;
- Submit reports in accordance with the terms of the Contract and as detailed below;

- **Advise SMO personnel on management methods to improve organizational performance and assist in introducing management concepts and methods;**
- **Assist the project entities coordinate, plan and help implement in-service seminars, workshops, and other activities to strengthen the skills of OFWM personnel relative to CWM objectives;**
- **Review existing planning processes, functions, and procedures as a basis for recommending improvements. Particular attention will be given to planning concepts; source, quality, and analysis of data; and the structure of the planning process;**
- **Initiates, coordinate, and assume responsibility for the preparation of commodity procurement lists with other team members and ensure the USAID/GOP approval is obtained and the commodities are purchased.**

Farm Management Specialist

One major function of the SMOs in each sub-project area will be to continuously monitor agricultural performance in the sub-project area and to formulate necessary adjustments in the operational plan in response to the data collected. The two Farm Management Specialists will assist in carrying out this function. They shall be responsible for giving a practical cast to CWM project concepts. They shall study farming systems at the field level; identify the interrelationships among water management issues, input supply, and cropping and cultivation practices; and translate this knowledge into practical project design, monitoring systems, and implementation programs. In carrying out their responsibilities, they shall assist in the following areas:

- **Advise and assist the SMOs' Senior Monitoring and Evaluation Specialists in carrying out their function of evaluating agricultural performance and the scheduling of non-water inputs.**
- **Advise on the type of output information to be monitored, such as cropping patterns and intensities, costs and returns in farming, correlations between input costs and increasing crop yields, and expected net benefits to any major public investments related to agriculture in the various sub-project areas.**
- **Assist with the development of appropriate questionnaires for both routine and special field surveys of farmers in various sub-project areas.**
- **Assist in the application of appropriate evaluation methods.**
- **Assist in developing extension materials of value to farmers based on analysis of the survey results.**
- **Assist in on-going in-service training activities.**
- **Assist in the development of operational plans and analyses for each sub-project area and assist in revision of such plans as information is provided by the monitoring/evaluation system.**
- **Assist in such areas as improving Water User Associations, watercourse maintenance, agronomic practices, farmer training, and irrigation scheduling.**

Water Management Specialist

These two advisors shall:

- **Assist the Sub-Project Management Office Water Management Units, and Provincial Irrigation and Agriculture Department staffs in developing and implementing irrigation management plans.**

- **Advise Sub-Project Managers in the selection and training of personnel for the Water Management Units within each SMO.**
- **Assist SMO in equipment acquisition for each Water Management Unit.**
- **Promote the use of micro-computers for water scheduling, assist SMO to develop/acquire software and arrange training of the Water Management Unit staff for the development of necessary skills in the use of micro-computers.**
- **Assist in developing water policy recommendations, presenting them to Policy Committees and other concerned organizations, and assist SMO in implementing the approved changes.**
- **Encourage the involvement of private enterprise in water management.**
- **Advise SMOs on specific design problems and provide on-the-job support and training.**
- **Assess the technical feasibility and appropriateness of using various equipment to improve the quality and cost effectiveness of watercourse rehabilitation and maintenance work and assist in implementing the use of such equipment. This will include the use of micro-computers for design and layout work and equipment for construction and maintenance. Consideration should be given to assessing capital, recurrent, and maintenance costs.**
- **Assist/advise on planning, designing, and implementing demonstration schemes for improved water management in cooperation with other expatriate team members and Sub-Project Managers.**
- **In the case of the Las Bela Sub-Project area and/or other areas, assist in designing efficient, cost-effective irrigation systems.**
- **Participate in seminars and workshops and other training activities such as selection of participants and subject areas.**
- **Assist in planning and implementing civil works activities.**
- **Collaborate with the PRC, Sheladia Associates and University of Idaho teams in developing and introducing sound irrigation system designs and watercourse maintenance methodologies to farmers.**
- **Advise SMO and other provincial level staffs on the selection of special impact evaluations related to irrigation.**

Extension Specialists

These advisors shall:

- **Assume principal responsibility for assisting the SMO/OFWM in the development of Water User Associations.**
- **Examine and become familiar with the current legislation at the Provincial and Federal levels dealing with WUAs and similar rural associations.**
- **Assist in training CWM, OFWM, and extension staff in rural organization techniques.**

- **Assist the extension personnel to understand and relate to farmers and assist them in understanding the procedures for obtaining loans, getting inputs for the farmers, farm management concepts, and how to participate in the decision-making process.**
- **Assist in developing an approach for working with WULAs in each sub-project area, assist in implementation of the approach, and refine as needed.**
- **Supervise, in close collaboration with Sub-project Managers and the USAID/Pakistan Social Scientist, the local WUA development Specialist.**
- **Assist with the development/implementation of the SMOs monitoring and evaluation systems and train SMO staff in methods of data-gathering, analysis and interpretation for planning purposes.**
- **Assist SMO's monitoring and evaluation officer in defining research, analysis, and planning tasks for the special impact evaluations.**
- **Assist SMOs evaluate socially-oriented data in order to guide program operations and evaluate operation plans, groups and associations as well as individuals.**
- **Assist in developing special studies of individual attitudes, group dynamics, and community participation as these pertain to the planning and implementation of the SMOs; operation plans and train staff in their execution.**

Agronomists

Two professionals with practical irrigation extension and farming, and/or agronomy research experience shall:

- **Advise SMO in monitoring appropriate project outputs as they relate to crop yields, variety, and quality, and in evaluating such data so that appropriate input adjustments can be scheduled.**
- **Assist SMO to collaborate with provincial and federal agricultural research/extension agencies and the University of Idaho team in the identification and development/adoption of technology packages in plant sciences and animal husbandry.**
- **When requested, assist project entities in developing extension materials in their areas of expertise and the planning of outreach programs in the sub-project areas.**
- **Assist SMO's in training activities in such areas as soil moisture measurement techniques, selection of crops to match water supply, irrigation requirements for various crops, agronomic practices, irrigation and land preparation methods, and use of appropriate farm implements.**
- **Assist with acquisition of equipment for water management programs.**
- **When requested, assist project entities by participating in seminars, workshops, and other supportive efforts and materials including design and implementation of mass media dissemination programs in the sub-project areas.**
- **Advise on demonstration plot activities as requested.**

WUA Development Specialists

When in-country and mobilized and contingent on support services and expense funding from sources outside this contract, the Contractor may hire and supervise these individuals directly. If the performance of any of the

WUA specialists is not acceptable, the Contractor shall select and employ other individuals subject to USAID and GOP concurrence.

Some of the major objectives of CWM are to: (a) organize and establish programs for WUAs to meet the O&M needs of the rehabilitated watercourses; and, (b) ensure that WUAs participate in the planning and decision-making of Provincial Irrigation Departments (PIDs) concerning the operations of sub-project area surface water delivery systems and public tubewells. The achievement of these objectives requires sustained and effective WUAs strong enough to influence PIDs irrigation water management decision-making. The services of seven WUA Development Specialists are needed over a period of three years commencing o/a December 1, 1985. Each WUA Development Specialist shall be expected to live in the sub-project area to which he is assigned for a period of three years. He will receive day-to-day direction from the Sub-Project Manager and shall turn for professional guidance and overall supervision to the extension specialist.

Each WUA Development Specialist shall perform the following general tasks:

- **Assist the Sub-Project Managers in organizing WUA programs to meet the operations and maintenance needs of rehabilitated watercourses in the area.**
- **Advise extension, OFWM and Irrigation Department staffs, to assist farmers to develop strong and sustained Water User Associations.**

During years 2 and 3, Specialists shall focus on developing new WUAs in the second minor commands on the one hand, and facilitating the establishment of first minor command WUAs into federations on the other.

Home Office Support Staff

Throughout the life of the project, the Contractor must provide regular Home Office Support to its field staff, e.g., arranging for orientation of short and long-term consultants to project activities and conditions in Pakistan and for the procurement of project commodities and supplies.

The contractor shall provide the home office support as given in Level of Effort Clause of Section H.

The Project Director listed in Section H shall:

- **Provide host country project leadership from the inception of the contract until the Chief of Party arrives in-country.**
- **Working in Pakistan and the U.S., assist the Chief of Party in laying the foundation for the contractor's involvement in CWM and prepare for the arrival of the other long-term advisors.**
- **Assist with initial review/revision of the Master Work Plan and with preparation of the individual work plans.**
- **Organize and carry out orientation activities for both short and long-term consultants.**
- **Provide support and advise to the technical consultants as necessary.**
- **Carry out procurement of project commodities as directed by USAID and the GOP.**

APPENDIX 8

MIDTERM EVALUATION TEAM SOW

PIO/T No. 391-0476-3-80033

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Islamabad 10865, May 16, 1988

Subject: Command Water Management Component of Irrigation Systems Management Project (391-0467) Evaluation.

1. MISSION REQUEST

Mission requests A.I.D./W assistance in obtaining services through a buy-in to Irrigation Support Project for Asia and the Near East (ISPAN) to conduct subject valuation, the description of which is provided in Para. 2 below.

2. EVALUATION STATEMENT OF WORK

2.1 ACTIVITY TO BE EVALUATED

Project Title:	Command Water Management (CWM) Component of Irrigation Systems Management (ISM) Project
Project Number:	391-0467
USAID Funding:	Dols. 25 Million
World Bank Funding:	Dols. 46.5 Million
GOP Funding:	Dols. 9.3 Million
LOP Dates	FY 85 - FY 91
PACD:	2/15/91

2.2 PURPOSE OF THE EVALUATION

The purpose of this interim evaluation is to assess project progress to date, particularly in the area of institutional development. The project paper called for an initial external evaluation during summer, 1988, approximately three years after the initiation of project activities. Recommendations will not only provide guidance for the remainder of the project but also inform the GOP, USAID World Bank and other donors about the value of similar CWM-type interventions elsewhere in the irrigation sector.

2.3 BACKGROUND

Irrigation is essential to agricultural productivity in Pakistan. The canal system, which feeds about 35 million acres of cultivable land, covers nearly 40,000 miles. Assorted watercourses, channels, and ditches measure one million miles. Overall efficiency is low. About 25 percent of the water is lost before reaching the farm, while irrigation efficiency at the farm level averages about 40 or 50 percent. Crop yields are less than half the estimated potential.

As part of an effort to introduce system-wide improvements in both the public and private sector, the GOP with the assistance of the World Bank and USAID initiated the CWM component of the ISM Project. The multi-faceted pilot program aims at bringing about physical and institutional improvements within a single command area, match water supplies, other crop inputs and services with seasonal crop requirements.

To achieve these goals, the CWM approach introduces three new elements to managing irrigation systems in Pakistan

- (a) increased farmer participation through the establishment and/or strengthening of up to 1,000 water user associations (WUAs);
- (b) coordinated institutional, physical and operational improvements in specific sections of command areas;
- (c) establishment of sub-project management offices (SMO) to coordinate water delivery, non-water inputs and services to increased irrigated agricultural production.

As a pilot activity, special efforts were made to cover different agro-climatic and hydrological zones. Seven sub-project areas were chosen: Pakpattan, 6R/Hakra, Niazbeg, and Shahkot (Punjab); Sehra-Naulakhi (Sind); Warsak Lift (NWFP); and Las Bela (Baluchistan). These pilot areas together represent about 510,000 acres of cultivable land and contain well over 1,000 watercourses varying in length from 1.5 to three miles.

CWM activities commenced on July 1, 1985. The USAID contribution entails a dols. 25 million grant, while the World Bank component funds civil works on distributaries and minors up to the outlet level, while civil works below the outlet and non-water inputs are funded by USAID. Specific project components include (1) institutional development; (2) training; (3) water management improvements (4) physical improvements; and (5) monitoring and evaluation.

2.4 SCOPE OF WORK

The objective of this interim evaluation is to assess progress made to date in achieving project objectives. Institutional issues in particular need to be stressed, with a view toward making a preliminary assessment of the CWM approach and providing recommendations aimed at improving implementation for the duration of the project.

The first question to be addressed by the evaluation team's appraisal is whether WUAs, in fact, have a role to play other than forming a collective for the purpose of building an improved watercourse (based on empirical evidence). That is, is there any reason to believe that WUAs are wanted or needed by the farmers surrounding a watercourse so that they receive better or more service and/or lower prices from government or private organizations?

The second major question concerns the organizational/institutional arrangement for directing project activities, i.e. the Sub-project Management Office (SMO). The SMO model is a significant deviation from the institutional model of on-farm water management as carried out by the Provincial OFWM Directorates. The evaluation team must analyze and discuss the two systems, whether the SMO model is worth pursuing or amending (and why), and whether the deficiencies regarding non-civil work tasks of the OFWM system could be modified to take on agronomic, drainage, WUA, non-flood irrigation, etc. This leads to an answer to the question of whether, and at what cost, SMOs are an improvement over the current OFWM system; whether it is cost effective or institutionally feasible to replicate; whether benefits justify expenses and whether, even if they do, is financing apt to be available.

A third policy question concerns the subsidy to farmers on the watercourse. How much do they pay, is it enough, what results, and are they satisfied? Farmers all want more lining and it appears that lining not only saves water but also serves an important socially useful function by decreasing social tension and conflicts

between water users. Should lining percentages be increased? At what cost and to whom? Will farmers pay an increased share of total costs for more lining? How much?

Specifically, the evaluation shall:

(a) Assess effectiveness of the Sub-project Management Offices (SMOs) in terms of advancing stated project objectives. Review the effectiveness of collaboration and coordination between departments. Assess the role played by project policy and coordination committees in meeting state project objectives. Review the relevance of the SMOs and Coordination Committees in delivery of inputs such as credit, fertilizer, seeds, and chemicals. Review the effectiveness of radio equipment used in facilitating communications, and effectiveness of computer utilization in data management and technical operations.

(b) Review separately the role, performance and contributions of the major consultants involved to date, including the TA team (Associates in Rural Development) and the supervisory consultants (NESPAK-NDC and Associated/Azheerudin/Ayoob Abidi and Associates) for both the World Bank and USAID components of the project.

(c) Evaluate progress made in establishing and/or strengthening WUAs in the various command areas to date and assess beneficiary attitudes and viewpoints in terms of the effectiveness of the project in meeting its stated objectives. Review status of the Federation of WUAs as well as status of water scheduling practices.

(d) Assess the management roles and working relationships among other main actors involved, including the GOP and donor agencies.

(e) Review the effectiveness of training programs and workshops (and other outreach activities) provided to date in terms of advancing overall project objectives.

(f) Evaluate the monitoring and evaluation program established under the project, including the evaluation design and progress made in implementing the baseline survey and the effectiveness of the Planning, Monitoring and Evaluation Units within the SMO. Assess to what extent gender specific data has been gathered/could have been gathered, as recommended by A.I.D./W. Assess whether control areas are necessary. Assess whether 6-month interviews with key informants, or other interim evaluation, is warranted.

(g) Review the status of planned civil works including land-levelling in each sub-project area, commenting on progress to date, quality of construction, and effectiveness of reimbursement procedures under both the World Bank and the USAID-funded components of the project. Review actual change in water management within the sub-project areas. Assess whether water scheduling or other types of water management is a realistic goal of the project. Evaluate whether water management is possible within the entire command, or just within individual water courses.

(h) Assess the visibility of the CWM activity within the overall community, including both small and large farmers, and providers of agricultural inputs.

(i) Examine the extent to which the involvement of various line agencies through this integrated approach has led to programs for increased productivity through a combination of water and non-water inputs. Discuss constraints standing in the way of achieving these production increases.

(j) Identify constraints faced by farmers, WUAs, SMOs, GOP agencies and the consultants related to responding to project objectives and their effect on the project. Discuss efforts being made to overcome these constraints.

(k) Briefly review cross-cutting issues generic to all A.I.D. evaluations, including: (A) assessment of which benefits are likely to be sustained after donor funding ends; (B) discussion of the extent to which environmental questions have been an issue; and (C) impact project is having on women.

(l) Based on the above analysis, comment on the effectiveness of the CWM approach at this stage in terms of meeting project objectives. Discuss perceived problems to date and provide "Lessons Learned" and recommendations for continued implementation of the project. Discuss the prospects for, and utility of, expanding and replicating the pilot program on a wider scale with specific reference to (a) economic feasibility and (b) institutional capacity to sustain the CWM approach.

2.5 TEAM COMPOSITION

The evaluation team shall consist of three expatriate and two local specialists to be provided by ISPAN under a Mission buy-in arrangement. ISPAN shall be responsible for fielding the local specialists and shall ensure that the local specialists are on board by the time expatriate specialists arrive in Pakistan to commence the evaluation. The expatriate group shall consist of two Management/Institutional Specialists, one of whom shall be designated as Team Leader and one Civil Engineer with a specialty in irrigation. The local group shall consist of one Civil/Agricultural/Irrigation Engineer and one Management/Institutional Specialist/Social Scientist. Minimum requirements for all expatriate team members include at least 15 years relevant experience and, preferably, prior work experience in Pakistan.

2.6 METHODOLOGY

There will be a "Team Planning Meeting" in Pakistan of up to three working days involving both the expatriate and local members of the team at the beginning of the evaluation.

The evaluation team shall review all available baseline data and background documents provided by the USAID, including the World Bank Appraisal Report, GOP Reimbursement Agreements, consultancy contracts, baseline survey contracts, the joint USAID/World Bank Aide Memoire dated June/July 1987, Annual and Quarterly reports by the consultants, and various SMO reports and work plans. Official project files are available from CNR and Agency Policy Papers are kept in the Program Office for review.

Preliminary meetings shall also be held with the Federal Coordinator (Dr. S. Masood Ali) as well as USAID and the World Bank for briefing purposes, and to finalize the travel schedule. The Federal Coordinator shall provide coordination and scheduling letter to all SMOs and related line departments and agencies and assist in securing GOP and Provincial security and travel clearances.

During the course of the evaluation, all seven project areas in all four provinces shall be visited. General procedures include preliminary meetings with SMOs and staff for briefing and scheduling purposes. Prior to departure, meetings shall also be held in each Sub-project Management Office to review and discuss preliminary findings. GOP, World Bank, and USAID personnel may accompany team members on some or all of their field visits.

Approximately halfway through the evaluation - e.g. at the end of the third week or beginning of the fourth week - team members shall meet with Mission staff in Islamabad to present preliminary findings and an overview of main conclusions developed thus far. Additional Mission input into the evaluation shall also be sought at this time.

On or about August 18, 1988, or one week prior to departure, a combined summary draft review shall be held in Islamabad involving USAID, the World Bank, and the Federal Coordinator, plus Provincial representatives. All members of the evaluation team--both expatriate and local--shall be present at this meeting. Fifty copies of the draft report shall be prepared and distributed one week prior to this meeting.

All the above activities will be completed in the first five weeks. The last week will be devoted to completing and finalizing the evaluation report. Fifty copies of this final report shall be provided to USAID for distribution to both GOP and World Bank.

2.7 PERIOD OF SERVICES

The services of all the specialists are required for a period of six weeks commencing o/a July 16 through o/a August 27, 1988. The specialists will work six days a week.

2.8 REPORTING REQUIREMENTS

The final report shall contain at a minimum the following sections: (1) basic project identification sheets; (2) Executive Summary of no more than five single-spaced pages reviewing major findings, conclusions and recommendations; (3) Main Report of no more than sixty single-spaced pages reviewing and analyzing the issues raised in the Statement of Work and concluding with a list of Conclusions and Recommendations.

A set of Appendices shall also be provided including at a minimum (1) the evaluation Statement of Work; (2) a bibliography of individuals and sources consulted; (3) a summary status report indicating status of Civil works constructed under the project thus far; and (4) assorted other material which cannot be adequately covered in the main body of the report but is still useful for assessing overall project progress.