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SINDH IRRIGATION & DRAINAGE AUTHORITY

INTEGRATED SOCIAL &ENVIRONMENTAL ASSESSMENT (ISEA)

WATER SECTOR IMPROVEMENT PROJECT (WSIP)

UPDATED & REVISED

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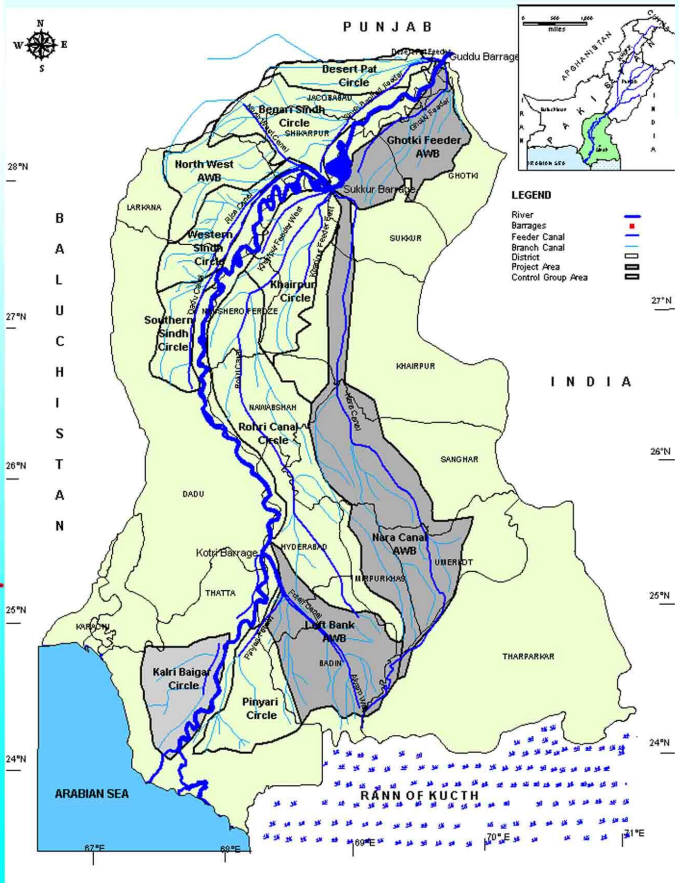
FINAL REPORT



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PREFACE

The report in hand is the Final (updated October 2006) of the ***Integrated Social & Environmental Assessment (ISEA)*** for proposed ***Water Sector Improvement Project (WSIP)***. This report encompasses the research, investigations, analysis and conclusions of a study carried out by ***M/s Osmani & Co. (Pvt.) Ltd.,*** Consulting Engineers for the Institutional Reforms Consultant (IRC) of Sindh Irrigation & Drainage Authority (SIDA).

The Proposed Water Sector Improvement Project (WSIP) Phase-I, being negotiated between Government of Sindh and the World Bank entails a number of interventions aimed at improving the water management and institutional reforms in the province of Sindh. The second largest province in Pakistan, Sindh has approx. 5.0 Million Ha of farm area irrigated through three barrages and 14 canals. The canal command areas of Sindh are planned to be converted into 14 Area Water Boards (AWBs) whereby the management, operations and maintenance would be carried out by elected bodies. Similarly the distributaries and watercourses are to be managed by Farmers Organizations (FOs) and Watercourse Associations (WCAs), respectively.

The Project focuses on the three established Area Water Boards (AWBs) of Nara, Left Bank (Akram Wah & Phuleli Canal) & Ghotki Feeder. The major project interventions include the following targets:-

- Improvement of 9 main canals (726 Km) and 37 branch canals (1,441 Km). This includes new lining of 50% length of the lined reach of Akram Wah.
- Control of Direct Outlets
- Replacement of APMs with agreed type of modules
- Improvement of 173 distributaries and minor canals (1527 Km) including 145 Km of geomembrane lining and 112 Km of concrete lining in 3 AWBs.
- Preparation of Drainage Development and Water Management Plan (DDWMP) of Kotri Basin and implementation of DDWMP for Kotri Left Bank Drainage Basin including studies for remedial works to offset tidal influence in the drains.
- Improved O&M of Irrigation & Drainage System through O&M Performance Contracts for drains and supply of maintenance equipment to FOs for which provision is made separately.
- Preparation of Master Plan for Left Bank of Indus Delta and Coastal Zone.

The exact locations of most of the project activities would be determined during the implementation phase based on different selection criteria keeping in view other projects of similar nature which are being implemented in Sindh Province.

Given the complexity of the subject as well as the requirements of the study, the time given for the assignment was limited, specially given that the study had to depend heavily on secondary data to be gathered from a number of government and private sector agencies.

While reading the report, it should be kept in mind that the objectives of the assignment were limited to study of Social and Environmental issues related to the project interventions. However, the ultimate goal of all such interventions is poverty alleviation and in this context, several other aspects also come into focus. As such, there is every likelihood of the intended outputs and expectations from the study to be magnified from the broader perspectives of poverty alleviation, as well as other pertinent but not directly relevant issues such as Pest Management, greater environmental issues like drainage, waterlogging & salinity, water quality issues, etc. Caution is, therefore, advised when looking at the outputs of the study which, while addressing the broader issues to some extent, has focused on the specific project interventions under WSIP-Phase-I.

An ISEA for Sindh On-Farm Water Management Project, (SOFWMP) was earlier prepared by Osmani & Company (Pvt.) Ltd. The SOFWMP envisaged similar interventions in almost the same project area. As such the current ISEA for WSIP is built-upon the previous ISEA for SOFWMP as per TOR of the current assignment.

The WSIP was at an initial / conception stage when the ISEA was carried-out and the physical and institutional interventions and their locations were not defined in detail till then. As such, the ISEA was prepared keeping in view the generalized and broad-based physical and institutional interventions prepared for the project. In September 2006, however, with the PAD prepared by the World Bank Pre-appraisal mission, the project interventions were defined in more details and the ISEA was accordingly modified to the extent possible. The current report is the updated version of the ISEA Final Report.

As part of TOR, a detailed report on Inundation of Coastal Areas of Badin was also prepared which has been made a part of this report as Appendix-A.

The Consultants wish to put on record the support provided by a number of people and agencies in collection of data and finalizing of the report. The team work that ensued among the Government of Sindh, SIDA, IRC, the World Bank and the Consultants during the preparation of this report was the result of commitment of all the persons involved to identify the social and environmental impacts and to improve the project design for maximizing the benefits to the poor.

Special thanks are due to the following:-

- Brig. (Rtd.) A. Haq, Project Coordinator, NDP Sindh
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The ISEA team wishes to acknowledge the cooperation of land owners, farmers and *haris* during detailed discussion and the household surveys without which it was not possible to accomplish the task.

LIST OF ABBREVIATIONS

ACS	:	Additional Chief Secretary
AD	:	Assistant Director
ADB	:	Asian Development Bank
AERC	:	Applied Economics Research Centre
AE&WM	:	Agriculture Engineering & Water Management
APM	:	Adjustable Proportional Modules
AWB	:	Area Water Board
BP	:	Bank Policy (The World Bank)
CAS	:	Country Assistance Strategy
CCA	:	Culturable Command Area
CCBs	:	Citizen Community Boards
CFAA	:	Country Financial Accountability Assessment
CWMP	:	Command Water Management Project
DA	:	Department of Agriculture
DBG	:	Drainage Beneficiary Group
DDWMP	:	Drainage Development and Water Management Plan
DD	:	Deputy Director
DG AE&WM	:	Directorate General Agriculture Engineering & Water Management
DPOD	:	Dhoro Puran Outfall Drain
EDO	:	Executive District Officer
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
EPA	:	Environmental Protection Agency
ERR	:	Economic Rate of Return
FAO	:	Food and Agriculture Organization
FFS	:	Farmers Field Schools
FGD	:	Focus Group Discussion
FGW	:	Fresh Ground water
FMC	:	Financial Management Consultant
FO	:	Farmers Organization
FOC	:	Farmers Organizations Council
FOs	:	Farmers Organizations
FSL	:	Full Supply Level
FT	:	Filed Team
GCA	:	Gross Command Area
GIS	:	Geographical Information System
GoP	:	Government of Pakistan

GoS	:	Government of Sindh
Ha	:	Hectare
HC	:	*HARI* Committee
IBIS	:	Indus Basin Irrigation System
ICR	:	Implementation Completion Report
IAM	:	Improved Asset Management
IDA	:	International Development Association (The World Bank)
IDMTA	:	Irrigation & Drainage Management Transfer Agreement
IEE	:	Initial Environmental Examination
IIMI	:	International Irrigation Management Institute (Renamed as IWMI)
IMD	:	Index of multiple Deprivation
IP	:	Indigenous People
IPD	:	Irrigation & Power Department
IPM	:	Integrated Pest Management
ISDS	:	Integrated Safeguard Data Sheet
ISEA	:	Integrated Social & Environmental Assessment
IUCN	:	International Union for Conservation of Nature
IWMI	:	International Water Management Institute
IWRM	:	Integrated Water Resources Management
K.F. East	:	Khairpur Feeder East
K.F. West	:	Khairpur Feeder West
KPOD	:	Kadhan Pateji Outfall Drain
LBOD	:	Left Bank Outfall Drain
M&E	:	Monitoring & Evaluation
MAF	:	Million Acre Feet
MD	:	Managing Director
MHa	:	Million Hectare
MIS	:	Management Information System
MTR	:	Mid Term Review
N.W. Canal	:	North West Canal
NCS	:	National Conservation Strategy
NDP	:	National Drainage Program
NDWS	:	Nara Desert Wildlife Sanctuary
NGOs	:	Non Government Organizations
NGR	:	Nara Game Reserve
NRSP	:	National Rural Support Program
O&M	:	Operation & Management

O-C-T	:	Owner-cum-Tenant
OD	:	Operational Directorate (The World Bank)
OECF	:	Overseas Economic Cooperation Fund (Japan)
OFWM	:	On-Farm Water Management
OFWMP	:	On-Farm Water Management Project
OP	:	Operational Policies (The World Bank)
O&M	:	Operational and Maintenance
OXFAM	:	A British NGO
P&D	:	Planning & Development
PC	:	Project Coordinator
PCD	:	Project Concept Document
PDC	:	Pakistan Drainage Consultants
PEPA	:	Pakistan Environmental Protection Act
PHED	:	Public Health Engineering Department
PCU	:	Project Coordination Unit
PSC	:	Project Steering Committee
PIC	:	Project Implementation Committee
PIU	:	Project Implementation Unit
PIA	:	Project Implementation Assistance
PIAC	:	Project Implementation Assistance Consultants
PLL	:	Precision Land Leveling
PMC	:	Projrct Management Consultant
PMP	:	Pest Management Plan
POL	:	Petrol, Oil and Lubricants
PPC	:	Provincial Policy Committee
RAP	:	Rapid Appraisal Process
PPM	:	Part Per Million
RFMS	:	Rural Financial Markets Study
SB	:	Statuary Body
SCARP	:	Salinity Control And Reclamation project
SGW	:	Saline Ground Water
SIDA	:	Sindh Irrigation & Drainage Authority
SM	:	Social Mobilization
SMCs	:	School Management Committees
SMO	:	SCARP Monitoring Organization
SOFWMP	:	Sindh On-Farm Water Management Project
SPDC	:	Social Policy Development Centre

SWMO	:	Sindh Water Management Ordinance
TBD	:	To Be Decided
TOR	:	Terms of Reference
TPV	:	Third Party Validation
TWS	:	Takar Wildlife Sanctuary
UNESCO	:	United Nations Education Science & Cultural Organization
USAID	:	United States Agency for International Development
VOs	:	Village Organizations
WAC	:	Water Allocation Committee
WAPDA	:	Water & Power Development Authority
WB	:	World Bank
WC	:	Watercourse
WCAs	:	Watercourse Associations
WMC	:	Water Management Component
WMED	:	Watercourse Monitoring & Evaluation Directorate
WOs	:	Women Organizations
WUAs	:	Water Users Association
WWF	:	World Wide Fund for Nature

LIST OF ACRONYMS

LOCAL WORDS	:	MEANINGS
ABIANA	:	Irrigation Water Tax
BARANI	:	Areas where Land is Irrigated only by Rain Water
CATTLE *GHAT*	:	Cattle drinking water points
DEH	:	Administrative unit of *TALUKA* comprising a number of villages
HARI	:	Sharecropper/Tenant
HARIS	:	Plural of *HARI*
JAMABANDI	:	Collection of irrigation water tax and agricultural income tax
KHARIF	:	Cropping Season of Summer
KUTHCHA	:	Unlined/Earthen
MOGHA	:	Watercourse off-take outlets/Modules
MOHANNA	:	Fishermen/Boat People
MUKHTIARKAR	:	REVENUE Officer at Taluka Level
NAIB NAZIM	:	Deputy of *NAZIM*
NAZIM	:	Head of Local Government
NUKKAS	:	Concrete turnouts of watercourse
PANCHO	:	Watering System for Rice in Sindh wherein water is given in such a manner that it retains in the field and is changed every week
PATWARI	:	Revenue Officer at *DEH* level
PUCCA	:	Lined
RABI	:	Cropping Season of Winter
TEHSIL/TALUKA	:	Administrative Unit in a District
THARI	:	People who live at Thar Desert of Sindh
THARIS	:	Plural of *THARI*
WAH	:	Channel
WANGAR	:	Work without pay
WARABANDI	:	Distribution of irrigation water on a weekly or 10 days turn system
ZARAI	:	Agricultural

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FOR
WATER SECTOR IMPROVEMENT PROJECT (WSIP)

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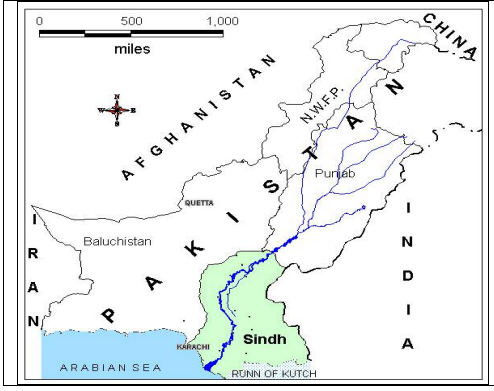
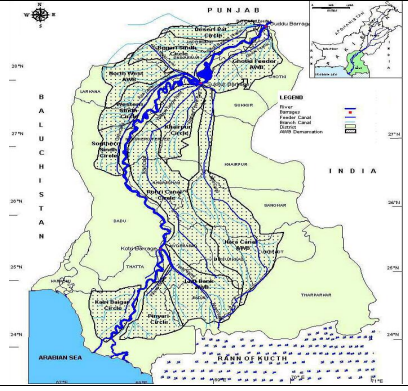
INTRODUCTION

General Background

Sindh with a total population of about 30 million stands as the second largest province of Pakistan and covers an area of 141,000 Sq. Km. A major part of Sindh's population (> 60%) lives in rural areas where poverty is pervasive. About 37% of the rural population lives below the poverty line, compared to 33% in Pakistan on an overall basis. Over 70% of the rural population is landless. Analysis of the 2001 Pakistan Rural Household Survey data shows that rural households, including the landless derive 56% of their income directly or indirectly from agriculture. A typical poor household in rural Sindh has little assets or land, depends on wage income, and is significantly larger than the non-poor household in Sindh or even compared to the average poor household of Pakistan. The rural poor are mostly employed as sharecroppers (haris) or agriculture wage labourers. Rural Sindh is highly dependent on public services with little role of the private sector. Thus, reforms to improve public service delivery and to stimulate rural growth that would inturn raise agricultural and non-agricultural wages are fundamental for reducing poverty in rural Sindh.

Map-1: Location of Sindh Province of Pakistan	Map-2: Irrigation Network in Sindh
	

The province of Sindh is a level flood plain formed by River Indus (also known as Lower Indus Plain), and has a vast network of irrigation covering an area of around 5 million hectares. The province is one of the major beneficiaries of the Indus Basin Irrigation System (IBIS), which is a life line of Pakistan's economy. Due to arid and desert like climate of Sindh, agriculture without irrigation is infeasible. Surface water is even more important in Sindh as most of its lands (78%) are underlain by saline groundwater, thus constraining groundwater resource base to supplement surface water sources. Despite its importance, surface water resource is managed inefficiently. The water use efficiency is low (~35 percent) and inequity in its distribution is pervasive leading to several social and economic problems adversely affecting the long term sustainability of the irrigated agriculture. The deteriorating irrigation infrastructure also poses a major challenge to the sustainability of Sindh's irrigated agriculture, which is the single most important source of employment and livelihood. Sindh also has a major problem of waterlogging and salinity due to inefficient use of water resources and lack of adequate drainage network. Progress in revamping the essential infrastructure is constrained by weak institutions, lack of proper governance, and inappropriate cost recovery and financing polices. Implementation of Water Sector Improvement Phase-I (WSIP-I) would be a major advancement in addressing the major issues of Sindh's irrigated agriculture.

Irrigation Sector Background

The Indus Basin Irrigation System (IBIS), the largest integrated irrigation network in the world, consists of Indus River and its tributaries, three major storage reservoirs, 19 barrages, 12 inter-river link canals, 13 irrigation canal commands, and over 110,000 watercourses, delivering water to farms. Water is diverted from the rivers through barrages or head-works into the main canals. Generally, the hierarchical canal system runs from main canals to branch canals, distributaries/minors and watercourses that supply water to chacks or dehs (tertiary irrigation command area) through moghas (un-gated outlets) in distributaries and minors.

Sindh has three major barrages on the Indus River that divert approximately 48 million acre-feet (MAF or 59 billion cubic meters BCM) of water annually to the 14 main canal commands in Sindh. These canal systems have an aggregate length of 11,916 miles (19,066 km) of canals, which serve a gross command area (GCA) of 14.391 million acres (5.8 million ha). There are about 42,000 watercourses (tertiary channels), which have an aggregate length of about 75,000 miles (120,000 km). Around 78% of the area in Sindh province is underlain by saline groundwater, which is unsuitable for irrigation. In addition, due to inadequate drainage system, nearly one-fifth of the canal command areas have been affected by water logging and salinity. There are 13 surface and 2 sub-subrface drainage systems in Sindh serving an area of only about 6.2 million acres (2.5 million hectares) and 0.10 million acres (0.04 million ha), respectively. The surface drainage system runs over an aggregate length of about 2.981 miles (4,800 km).

Traditionally, the whole irrigation system is a public property except the watercourses. The construction, operation and maintenance of the irrigation system up to Minor level have been the responsibility of the Provincial Government's Irrigation & Power Department (IPD). The watercourses are, however, the joint responsibility of the landowners who construct, operate and maintain these watercourses based on the water quantity sanctioned by the IP Department. However, with the devolution plan in place,

the irrigation system is set to be shifted from a centrally controlled and inefficient system to a more robust and efficient one supported by institutional reforms that are in the offing. The Sindh Irrigation and Drainage Authority (SIDA) has already been formed and functional in three Area Water Boards (AWB) while the management of minors and distributaries is being handed-over to the Farmer's Organizations (FOs).

Issues and Constraints

Irrigation and drainage (I&D) in Pakistan face major issues that are evident in various forms with many of them stemming from underlying institutional weaknesses. The major institutional issue is a near exclusive control of the irrigation and drainage system by public sector entities, characterized by the usual inefficiencies of centralized bureaucracies, lack of corporate skills and poor client (farmer) focus and accountability.

Lack of storage capacity[1] and control structures is another major constraint. Water availability in the IBIS is highly seasonal with 85% of annual river flows occurring during a 90 to 120 days period (June to September) making storage imperative for the *Rabi* (winter – November to March) cropping season, during which the main staple crop (wheat) is grown and in early *Kharif* (summer – April to October) season, during which cash crops (such as cotton, rice and sugarcane) are grown. The three major reservoirs (Tarbela, Mangla, Chashma) that were constructed before 1970's provide some flexibility in canal operations to meet irrigation water demand but these storages are silting up and inadequate to meet the needs of growing population. Since 1970's Pakistan has not been able to make investments to capture and expand additional surface water supplies for irrigation.

This also reflects the underlying weakness of institutions that are not able to capture even a small part of huge economic returns from irrigation. Such are investments that are necessary to keep up the system for meeting future requirements. Institutional weaknesses manifest in the form of: *(i) low water use efficiency* (only about 35-40% from the canal head to crop root zone); *(ii) water distribution inequities; (iii) waterlogging and salinity; (iv) poor operation and maintenance (O&M) and low cost recover; and (v) constrained investment climate.* In Sindh, these issues are even more acute because a major part of its irrigated lands are underlain by saline groundwater, thus lacking groundwater resources that can supplement surface flows; ominous land tenure system with large number of very influential farmers often interfering in the operation of the irrigation system, and relatively lower institutional capacity.

(i) **Low irrigation delivery and application efficiencies** arise from several factors, including excessive lengths of unlined alluvial channels; lack of routine and preventive maintenance; channel erosion and siltation; inadequate control structures, culverts and cattle drinking points; nonstandard outlets for irrigating the fields; poorly leveled farms; and inappropriate scheduling of water in canals not reflecting crop water requirements. High water losses not only reduce water availability for crops but also contribute to water logging and salinity particularly in Sindh where most of the lands are underlain by the saline groundwater. With reduced water availability, irrigators at the tail-ends of the system, in particular, are exposed to greater risks of crop failures leaving little incentive for them to invest in non-water inputs.

[1]Pakistan Water Country Assistance Strategy – Pakistan's Water Economy Running Dry, 2005.

(ii) **Water distribution inequities** result from excessive losses in the conveyance system, unauthorized outlets and illegal pumping from canals, facilitated by rent seeking agency field staff. Poorly maintained watercourses and distributary/minor canals have the highest incidence of illegal diversions. Direct outlets (DOs) from main and branch canals further contribute to inequitable distribution due to withdrawals in excess of authorized discharges. Inherently DOs do not have regulating structures and receive water even during periods of water shortage, when normal outlets receive water by rotation. This accentuates the inequities in water distribution by concentrating water shortages in the tail reaches of channels, sometimes forcing rotation to the distributaries/minors even when full design discharge is available at the head of main canal and river. Except for those canal commands where Area Water Boards (AWBs) and Farmers' Organization (FOs) have been formed, there are no effective forums for farmers to raise their concerns. Moreover, the excessive role of the government in irrigation management does not encourage meaningful beneficiary participation in the system management.

(iii) **Wasteful use of water** on the farms stems from several factors. Firstly, farmers tend to over-irrigate partly because of the wrong notion that higher watering means higher yields, but partly also because they are unsure whether they would get their next turn of irrigation on time. Thus, over watering is often viewed as insurance for the future. Secondly, scheduling of water is inappropriate - canal deliveries generally bear little relationship with crop water requirements. In the *Kharif* (summer crop) season, when river supplies are plentiful, the water deliveries in canals often exceed crop requirements. There being few escape structures in the canal system, once water is diverted in a canal, it is delivered to watercourses and to the farms, regardless of whether the crops need it or not. This practice in some areas results in flooding problems during extreme monsoon storms that usually occur at the same time when water is surplus in the canal system. Thirdly, inefficient cropping patterns and agronomic practices such as plantation of rice by the *Pancho* method also promote wasteful water use. Under this method of rice plantation, water is continuously delivered to the fields and allowed to cascade from one field to another, finally leading to surface drains. The resulting water use efficiency is extremely low and water logging and salinity problems are exacerbated. Fourthly, the practice of flooding the entire field for irrigation on a poorly leveled fields result in wastage of irrigation water. Finally, underpricing of water and inefficient systems and procedures for assessment and collection of water charges provide little incentive for improving water use efficiency.

(iv) **Water logging and Salinity**. Most of the Sindh (>80%) is underlain by saline groundwater. Thus, water lost through seepage from canals and fields, unlike fresh groundwater areas, is wasted and cannot be re-used by groundwater pumping. This results in shallow groundwater levels, waterlogging, and severe soil salinity (high evaporation rates in arid climate mobilize salts from lower soil profile upwards, increasing soil salinity in the root zone). The high soil salinity in turn requires high application of irrigation water to dilute and leach the salts from soil profile to make cropping possible. This vicious cycle of "high irrigation application-high seepage-shallow groundwater levels-waterlogging and salinity" can only be broken by improving the irrigation and drainage management.

(v) **Inadequate operation and maintenance (O&M) and Low Cost Recovery**. The century-old irrigation and drainage infrastructure is in a state of *disrepair and rapid deterioration* due to utilization beyond design capacities, tampering of control structures, damage to canal banks caused by human and cattle trespassing, and inadequate routine and preventive maintenance. During the last 10 years, the average annual expenditure on O&M of irrigation and drainage infrastructure in Sindh was 28% short of requirements. Both the provisions and actual budget releases are inadequate to meet the O&M requirements. Salaries of the overstaffed irrigation department account for over 50% of the total O&M budget. While there is an accumulation of deferred maintenance all over the system, smaller irrigation channels (distributaries and minors) are the most neglected. In many cases, small channels operate without control structures (gates, regulators). Water charges and drainage access account for less than 20% of expenditures on O&M.

(vi) **Constrained Investment Climate in the Sector.** Returns from irrigation are very high in Pakistan. Despite large needs for investments in I&D sector to expand water supplies, improve water management and control, and to upgrade and modernize the century old system, the required investments are not forthcoming over the last three decades, resulting in its continued deterioration. With sector reforms underway the investment capacity would increase, albeit slowly, as the systems are developed to capture a part of the economic returns from irrigation for upgrading the system. Meanwhile, the Government has to continue a minimum level of investment in the sector to avoid the total collapse of irrigation and drainage systems and irrigated land turning into deserts or salt fields, reclamation of which would become impossible or require huge investments. The current project would help in avoiding an environmental and social disaster due to the deterioration of the irrigation systems.

These issues are enormous and complex, addressing them would require large investments and long-term commitment. The Water Sector Improvement Phase-I Project (WSIP-I) would make a start with an optimal mix of institutional strengthening, capacity building and investments in the irrigation sector. The Project is designed to address the major issues of irrigation and drainage sector mentioned above, firstly, by deepening and broadening the reform program underway in Sindh by providing support to Sindh Irrigation and Drainage Authority (SIDA) at the provincial level, AWBs at the canal commend level and FOs at the distributary/minor canal level. This would lead to decentralization and participatory irrigation management. Secondly, the project would make substantial investments in rehabilitation/improvement of the irrigation canals and major hydraulic infrastructure in the province. The two interventions combined will result in improving water delivery efficiency, reliability and equity of water distribution leading to increased agricultural productivity, employment and income.

Project Objectives

The proposed Sindh WSIP-I envisages improved efficiency, reliability and equity of irrigation water distribution in three Area Water Boards (AWBs), namely Ghotki, Nara and Left Bank. These objectives will be achieved through:

i). Deepening and broadening the institutional reforms already underway in Sindh;
ii). Improving the irrigation system in a systemic way covering key hydraulic infrastructures starting from barrages, main and branch canals, and distributaries and minors, while watercourses are being renovated under Sindh On-Farm Water Management Project (SOFWM) and national program; and
iii). Enhancing long-term sustainability of irrigation system through participatory irrigation management and developing institutions for improving operation and maintenance (O&M) of the system.

The following interventions would be adopted for achieving the objectives:

i). Increased conveyance efficiency across canals, distributaries/minors, watercourses and farms;
ii). Reduced discharge of drainage water;
iii). Higher consistency between water supplied by the system and water demanded by the farmers through a close monitoring of crop water requirements on a ten-day, monthly, seasonal and annual basis;
iv). Reduced incidences of canal breaches;
v). Regular measurement of delivery performance ratio (DPR) between watercourses located at head and tail of the canal system;
vi). Farmer's participation through FOs (Farmer's Organizations) in taking over distributary/minor canals control and IDMTA (Irrigation and Drainage Management Transfer Agreement;
vii). Increased abiana collections by the FOs and assurance of adequate repair and maintenance work at distributary/minor level by the FOs; and
viii). Reduced irrigated land area with shallow groundwater and soil salinity.

Project Area

The project area for the proposed Sindh WSIP-I would consist of irrigated area of three Area Water Boards (AWBs), namely Nara Canal, Ghotki Feeder and Left Bank Canals (Akram Wah and Fulelli canal commands) that have been established and already functioning (Map 1.1).

Institutional and Implementation Arrangements

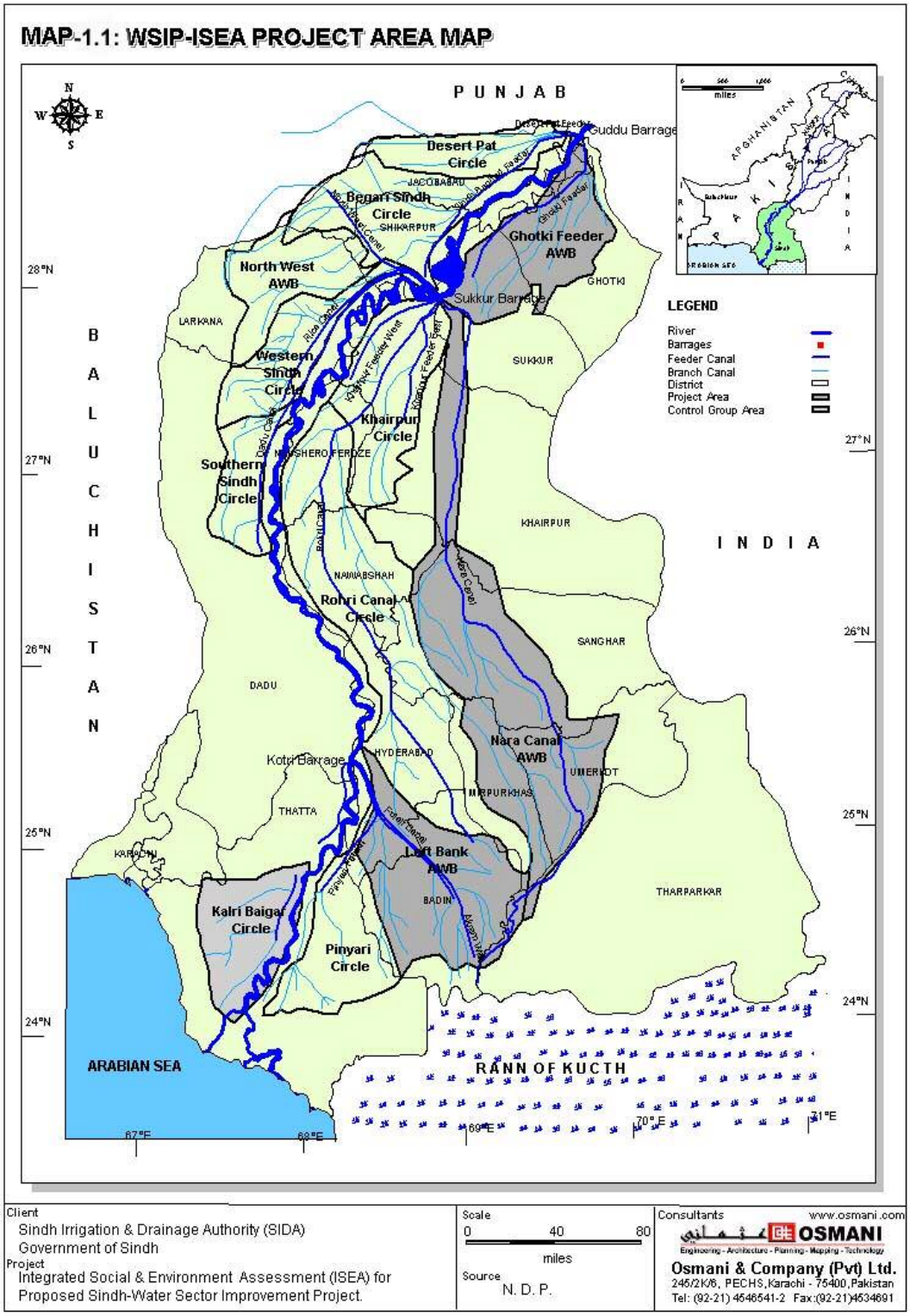
The Sindh Irrigation and Drainage Authority (SIDA) would be the primary project implementing agency. The SIDA has a Board chaired by the Minister of Irrigation and Power Department (IPD). SIDA would be responsible for, inter alia, registering FOs under the SWMO 2002 and entering into IDMTAs with FOs; building capacity of FOs and providing post-IDMT support; and maintaining consolidated project accounts, preparing disbursement applications and operation of the Special Account (SA) and transfer of funds to other implementing agencies, and contributing to the project's overall

management information system. SIDA would also be responsible for procurement of major contracts under the Project, preparation of the master plan for flood and drainage management on the left bank of the Indus river, plans for delta area and costal zone (Component C2 – see section 1.7 below for project components) in coordination with other concerned provincial and federal agencies, future project preparation (Component E2) and technical assistance, and training and strategic studies (component E3). SIDA's Board would meet quarterly to address project issues and make key decisions regarding investments as well as institutional strengthening.

The Area Water Boards (AWBs) would be responsible for implementing civil works for improvement of main and branch canals (Component B1 of the project); water scheduling in main and branch canals; assisting FOs in identifying, preparing and implementing sub-projects for rehabilitation of the distributary/minor canals (Component B2); receiving AWB/SIDA share of *abiana* from FOs; improvements of the drainage system (Component B3) of the project.

Farmer Organizations (FOs) are legal entities as defined under SWMO 2002. The FOs are bound by, and operate in accordance with their bylaws. FOs would have a central role in project implementation. Registered FOs who enter into IDMTAs with SIDA/AWBs would progressively take over irrigation management from the AWBs. They would distribute water among users, collect water charges, maintain income and expenditure accounts, and carryout routine O&M and repairs of the distributary/minor canals above the *mogha.* FOs would be eligible for project assistance for improving distributary/minor canals and they would be assigned an assistant engineer to help them in their work. They would identify, plan and implement distributary improvements under Component B2 of the project. SIDA/AWBs, through their project implementation consultants, would provide technical assistance for carrying out surveys, designs and bidding documents. FOs would themselves carry out rehabilitation works costing upto US$100,000 equivalent under community contracts with AWBs.

Irrigation and Power Department (IPD) would carry out the feasibility studies for rehabilitation of barrages (Component C1) of the project and coordinate in preparation of the master plan for the Indus left bank, delta and coastal zones (Component C2). It would work closely with SIDA/AWB in operation of the canal system and implementation of all activities on main and branch canals.



Project Management Consultants/Procurement Agent (PMCA). A United Nations Food and Agriculture Organization (UN/FAO) team would be appointed as the PMCA under the project for recruitment and supervision of the consulting services under the Project. The PMCA would be based on the Project Management and Coordination Unit

(PCMU) under the P&D Department. PMCA to be appointed for the duration of the project would be responsible for preparation of request for proposal packages (RFP), review of the terms of reference (TORs), short listing of consultants, evaluation of technical and financial proposals, and award of the contract. During project implementation, the PMCA would review any changes proposed in the TORs or scope of work of the consultants and variations resulting from such proposals, oversee their work and evaluate the performance of the consultants in carrying out their responsibilities, examine if the purpose of consulting services is being achieved, as well as if payments are made to the consultants. The PMCA would also support in recruitment of SIDA and AWBs staff that would be recruited under the project. PMCA would develop and manage a website showing the status of all procurement actions under the project as well as implementation status of the project.

Project Coordination and Monitoring Unit (PCMU) established under the Planning and Development Department will monitor and coordinate all project implementation activities. It would be responsible for carrying out project monitoring and evaluation studies and supervision of the overall project environmental management plan as well as subproject specific level environmental and social plans. For M&E studies, independent consultants would be recruited under the Component D of the project. The M&E consultants would maintain a website showing the implementation status of the project as well as the project impact and findings of various evaluation studies. PCMU would also carry out various studies and manage technical assistance and training under component E2 of the project. As mentioned above, the project management consultants/procurement agent would be based in the PCMU.

Project Steering Committee (PSC) headed by the Additional Chief Secretary Development (ACS Development) already established in Sindh would provide policy guidance and monitor overall project implementation and outcome. The PSC would comprise of Secretaries of Irrigation and Power, Agriculture, Finance, Forestry, Environment, Emergency Situations, Director General Agriculture Engineer and Water Management (DGAEW), Managing Director (MD) SIDA, Project Coordinator of PCMU, Team Leader of PMCA and representative of the Federal Ministry of Water and Power, and Planning Commission. The PCMU will act as the secretariat of the PSC. The PSC will meet at least once every quarter or more frequently whenever issues requiring resolution are submitted for its consideration. The PSC would: (a) Review physical and financial progress reports, evaluate outcomes (including those relating to social and environmental safeguards), ensure consistency of project implementation with the Implementation Framework, provide policy guidelines and advise implementing agencies how issues affecting implementation can be overcome; (b) Ensure provision of adequate budgetary allocation for timely implementation of the Project and for O&M; (d) Resolve issues not settled by the SIDA and PCMU; (e) Ensure adequacy and continuity of project management staff; and (f) Ensure that project complies with legal and financial covenants.

The project will be primarily implemented by the Sindh Irrigation and Drainage Authority (SIDA) under overall guidance of Sindh Government, through its Planning and Development (P&D) Department with day-to-day coordination by Project Coordination and Management Unit (PCMU) within the P&D Department.

Project Components

The Project consists of the following components with estimated total cost of about US$ 175 million:

Component A: Community Development and Capacity Building (US$10 Million): Sindh Irrigation and Drainage Authority's (SIDA) capacity would be enhanced to carry out functions in accordance with the Sindh Water Management Ordinance of 2002 (SWMO 2002) in managing water sources in the province and irrigation and drainage services. The Project would provide support in rehabilitation of SIDA offices, developing capacity to transform I&D services from the traditional system to a new structure of FOs and AWBs, by providing staff with expertise in social mobilization, capacity building of FOs, training, legal advisors, and by establishing an Environmental Management Unit (EMU) to strengthen its capacity for integrating environmental considerations in planning, development and use of water resources.

The component would help SIDA to acquire an image of modern service oriented organization with clearly defined roles and responsibilities in the irrigation and drainage sector. Among other things SIDA would: (a) develop rules, procedures, and guidelines for management of water resources and I&D systems in the province; (b) procurement rules, financial management, administrative rules and procedure; (c) staff rules and procedures for recruitment, code of conduct, administrative powers and decision making process within the organization, (d) technical standards, design specifications for various kinds of infrastructure; (e) environmental guidelines, rules and procedures to integrate environmental issues in planning, design and operation of the water resources management systems; and (f) O&M procedures, standards, yardsticks and inspection mechanisms, etc. SIDA would establish a water resources management information system (MIS) to help improve management of the water resources and operation of canals, drainage and flood management systems. It would also develop a website for disseminating the information to public about the operation of the canals, flood warning and management operations, and make arrangements for broadcasting information on local radio using FM bands.

Similarly, the Project would support AWBs in carrying out their pivotal role in improving irrigation and drainage service delivery to the FOs. The FOs are the most essential building block of irrigation and drainage institutions providing crucial services to the users. FOs have been formed on about all distributaries/minors, approximately 369 in three AWBs of the project area, under the NPD, ongoing Sindh OFWM Project and other national programs. The project would strengthen and enhance capacity of about 269 FOs while remaining 100 FOs would be covered by the Sindh OFWM Project.

Component B: Rehabilitation and Improvement of Irrigation and Drainage System (US$135.9 Million): A systematic approach would be adopted in improving the irrigation network starting from the barrage to users in the three AWBs included in the project. The project would cover all main and branch canals and distributaries/minors while watercourses are being improved under the national program and Sindh OFWM Project. The necessary works comprise of four sub-components:

B1. Main and Branch Canals. The component would include the main and branch canals of the Ghotki canal system, the Nara canal system and the Fuleli canal systems. The Government is starting a study for the enlargement of the Akram Wah canal system

in the Left Bank AWB. The project would provide assistance in preparation of detailed feasibility and designs for the Akram Wah system. The Project would cover some 820 km of main canals and 1,130 km of branch canals. In addition to rehabilitation and improvement to canals, a system of water measurements and accounting would be introduced throughout the main and branch canal systems and at the distributaries and minors. For that purpose, appropriate flow measuring sections would be constructed, if necessary, and water measuring devices would be installed throughout the canal system. A data communication network would be installed to gather information and that will be sent to central locations at AWBs and SIDA offices. A database and management information system would be developed to collect, store and disseminate flow data helping systemwide water management. Modern control rooms for operation and management of the canals would be established at the AWBs and the SIDA. Detailed designs for rehabilitation/improvement of main and branch canals systems would be prepared during the project implementation. Full design report outlining the technical, environmental, social and economic aspects along with any environmental management plan (EMP) or social management plan (SMP) would be prepared according to the Bank guidelines for each canal system. These design reports upon approval would form the basis for preparing the bidding documents for carrying out the construction works and implementing EMP and SMP actions where necessary.

B2. Distributaries and Minors. Out of 369 distributaries and minors in the project area, 173 with a total length of about 1,500 km would be rehabilitated and improved under the project. About 100 distributaries are covered under the ongoing Sindh OFWM and remaining 96 under the national program. The FOs would be involved in all stages of work on the distributary/minor canals including identification, planning, prioritizing, designing and construction of rehabilitation/improvement works. The FOs also would carry out the distributary works under community-based contracts (CBCs). The rehabilitation works would be designed in lots of 5 distributaries adjacent to each other or as close as possible. As stated above, for FOs strengthening one Assistant Engineer would be assigned covering the 5 distributaries at a time. The Project Implementation Consultants (PICs) would prepare a design report for each group on at least five of the distributaries outlining the major issues, outcome of the joint walk-through of the channels, prioritization of works, technical solutions, design parameters, cost estimates, and environment and social impact that has to be accounted for in design and construction management, etc. These design reports would form the basis for preparation of construction plans, detailed designs and bidding documents, and implementation of environmental and social action plans.

An allocation of Rs. 1,200 per acre (US$50 per ha) is made for distributary canals in the Ghotki and Nara canal command and 1,680 Rs. per acre (US$70 per ha) for distributaries in the Fuleli and Akramwah because these channels generally have higher discharges. The works at the distributary channels may cover (i) desilting and creating proper section of the distribtary channel; (ii) reconstruction of channel banks and berms, inspection path and strengthening of the non-inspection path bank; (iii) reconstruction of outlets; (iv) repair and reconstruction of head works and regulating structures in the distributary; (v) construction of measuring sections, buffalo wallos, and washing ghats where necessary; (vi) rehabilitation and construction of foot and road bridges, and any other works identified by FOs; (vii) plantation of trees on land available along the distributary; and (viii) rehabilitation and/or construction of FOs' offices, provision of office equipment, furniture, facilities, and stationary. The selection of works would be

done by the FOs based on their own priorities within the available funds, and have the option to carry out the works under CBCs.

B3. Improvements of the Drainage System. Substantial investments have been made in improving the drainage system in recent years under various projects. While the main focus of the WSIP-I is irrigation infrastructure, some funds are provided to address major bottlenecks that may exist in the project area in safe disposal of the drainage effluent and areas managed by the FOs. The scope and works to be included in this component would be identified by SIDA/AWBs in consultation with the FOs.

B4. Design and Construction Supervision. This component would cover the cost of surveys and investigations, consulting services for consultations with the FOs in identifying and prioritizing the works, preparation of detailed designs, bidding documents, procurement of works, and construction supervision covering all works included in components B1 through B3.

Component C: Asset Management of Major I&D Infrastructure (US$14 Million). The component would include:

C1. Feasibility Studies for Barrages. This would include feasibility studies and preparation of designs for rehabilitation and remedial works for the Gudu barrage requiring immediate attention due to its dilapidated state; assistance in reviewing the ongoing feasibility studies for rehabilitation of the Sukhar barrage and in proceeding to the detailed design stage; and inspection as well as assessment of the state of the Kotri barrage and studies for carrying out remedial works that may be necessary.

C2. Preparation of Master Plan for Left Bank of Indus, Delta and Coastal Zone. The component would support detailed studies and preparation of a regional master plan in consultation with the stakeholders for addressing the flooding issues and providing proper drainage to the area on the left bank of the Indus River considering structural and non-structural measures, including remedial measures for any outstanding deficiencies in the Left Bank Outfall Drainage system, measures for retention and/or safe disposal of storm and flood water. A plan would be prepared for rehabilitation and improvement of delta area, wetlands and the coastal zone considering environmental importance of the region and its economic potential drawing upon international experience. The detailed design would be prepared and made ready for implementation for the priority works identified under the master plan.

Component D: Monitoring and Evaluation of the Project Impact and Environmental Management Plan (US$4.2 Million).

The monitoring and evaluation (M&E) activities would provide continuous feedback to the Government of Sindh (GOSindh), Project Steering Committee (PSC), and implementing agencies on the project's performance and impact of its various components, so that corrective actions could be undertaken in a timely manner. They will also supervise implementation of the overall EMP, careful review and monitoring of subproject specific social and environmental management plans and supervision of their implementation. The M&E activities are thus likely to cover, inter alia, (i) the impact of the I&D improvements on water use efficiency at various levels of the system, reliability and equity in water distribution, irrigation water supply at various levels of the system and drainage flows, groundwater levels and quality, and soil salinity; on-farm water use; cropping patterns and yields; and livestock population, health and production; (ii)

performance of the FOs and their activities in O&M of the system, service delivery and collection of *abiana* and availability of budget for management of the system; (iii) environmental impact of construction activities in the project area in particular on any wetlands, ecologically important sites, population and livestock; (iv) any acquisition of public and private land and assets, agreements reached and arrangement made for acquisition of assets on a voluntary basis; (v) socio-economic impacts and the impact on the level of unemployment and household incomes in the project area; estimation of the project's overall benefits and economic rate of returns etc.

Component E: Project Coordination, Monitoring, Technical Assistance and Training (US$10 Million): This component would support the Government in implementing the project, coordinating all project related activities and preparing a follow-on project. It would include: (i) support for the operation of the Project Coordination and Monitoring Unit (PCMU) within the Planning and Development (P&D) of Sindh; (ii) Project Management Consultants/procurement (PMCA) agent for recruitment and management of all consulting services and staff under the project, and monitoring of their performance; (iii) technical assistance and training in such areas as detailed design, contract administration and construction supervision, procurement, financial management, legal issues, irrigation and drainage and agricultural development; (iv) project preparation (feasibility studies and preparation of bidding documents) for the Phase II; and (v) strategic studies which may be identified during the project implementation such as: (a) study for improving revenue assessment and collection, improving the effectiveness of FOs; (b) introduction of modern tools for irrigation scheduling in the project area at the branch and distributary canal level and at the AWB and FO levels; (c) assistance with budgeting and accounting for O&M to the AWBs, and FOs; and (d) training and study tours; (e) studies for improving water management in the region in the delta area and the coastal zone; and (f) monitoring of key hydraulic infrastructure in the province. This would involve financing of incremental staff salaries, operating expenditures, consulting services, equipment and software.

The ISEA

The Integrated Social and Environmental Assessment (ISEA) was prepared as part of the project preparation process in collaboration with the Government of Sindh, Sindh Irrigation and Drainage Authority (SIDA) and Project Coordination and Monitoring Unit (PCMU). An ISEA for Sindh On-Farm Water Management Project (SOFWMP) was earlier prepared by Osmani & Company (Pvt.) Ltd., Consulting Engineers for the Sindh Irrigation & Drainage Authority (SIDA). The SOFWMP covered the same project area with some similarities in interventions. As such the current WSIP-I ISEA is built upon the experience of SOFWMP ISEA.

At the initial stages of the ISEA, the details of physical and institutional interventions under WSIP were not available. The ISEA was then prepared keeping in view the general and broad-based physical and institutional interventions prepared for the project. During 2005, the WSIP was better defined based on which draft final ISEA was prepared in September 2005. This draft and its summary (also translated in Sindhi) were the basis for consultation workshops that were held in January 19, 25 and March 29, 2006 in Ghotki, Badin, and Mirpurkhas, respectively. The feedback received was incorporated into the Project design. The final draft of the ISEA was also disclosed at the Bank's Infoshop in December 2005. During summer of 2006, the project design became final and accordingly ISEA was updated. Based on final version, a second round of

consultations/disclosure sessions were held on October 5, 7 and 9 in Ghotki, Badin and Mirpurkhas, respectively, and an updated Sindhi translation is being disclosed.

Scope of Assignment

According to the Terms of Reference, the scope of the ISEA study is as follows:

(a) Identify key stakeholders, especially poor and vulnerable groups, and through consultation with them, formulate a participatory framework to ensure that these groups benefit from the project;
(b) Identity capacity building measures that would enable effective participation and mitigation measures;
(c) Assess, compare and synthesize lessons from various earlier and continuing initiatives in the sector;
(d) Assess the possible effects of heavy rains in Badin District in Jul 2003 and advise on measures that can be undertaken possibly in WSIP-I or other interventions to minimize such impacts in the future;
(e) Identify and assess potential social and environmental impacts of the project and prepare guidelines and framework to manage environmental and social impacts in sub-projects; and
(f) Ensure compliance with Government of Pakistan and World Bank Laws and Directives on social and environmental issues.

ISEA METHODOLOGY AND FIELDWORK

The overall methodological framework designed for the ISEA comprised the following sources of data and stakeholders:

2.1 Review of Policies, Guidelines and Legislations

In order to determine the policy, legal and institutional environment for the project, the consultants reviewed the applicable policies, guidelines and legislations concerning the WSIP. As the project is to be implemented by the Government of Sindh and funded by the World Bank, two sets of policies and legislations were reviewed:

i). Government of Pakistan and Government of Sindh policies and legislations, and

ii). The World Bank Guidelines, Policies and Directives.

The following basic project related documents were provided to the consultants, which formed the basis of the study requirements:

- Terms of Reference issued by Sindh Irrigation & Drainage Authority
- Project Concept Document (PCD) by the World Bank
- Draft Project Appraisal Document (PAD) by the World Bank (updated from time to time)
- Integrated Safeguard Data Sheet (ISDS) by the World Bank
- The Sindh Water Management Ordinance 2002 promulgated on October 26, 2002

Based on the above basic documents, the following relevant policies, guidelines and legislations were reviewed by the consultants:

- National Environmental Guidelines and Legislation - Pakistan Environmental Protection Act 1997
- Sindh Wildlife Protection Ordinance, 1972 and Amendments 2001
- The Sindh Water Management Ordinance 2002
- The Convention on Wetlands of International Importance, Ramsar 1971
- Land Acquisition Act 1894
- Framework for land Acquisition and Resettlement, National Drainage Programe-1 January 1996 (Revised May 2001).
- The relevant World Bank Operational Policies and Directives
    - Operational Policy on Environmental Assessment (OP 4.01), January 1999
    - Operational Policy on Natural Habitats (OP 4.04), June 2001
    - Operational Policy on Forests (OP 4.36), November 2002
    - Operational Policy on Pest Management (OP 4.09), December 1998
    - Operational Policy on Cultural Property (OP 4.11), August 1999
    - Operational Directive on Indigenous Peoples (OD 4.20), September 1991
    - Operational Policy on Involuntary Resettlement (OP 4.12), December 2001
    - Operational Policy on Safety of Dams (OP 4.37) October 2001
    - Operational Policy on Projects in International Waters (OP7.50), June 2001

- Operational Policy on Projects in Disputed Areas (OP 7.60), June 2001

Detailed reviews, applicability and the relevance of the above to the project are discussed in Chapter 3 of this report.

2.2 Review of Relevant Institutions, Teams and Farmer Groups

The ISEA covered both formal and informal institutions that are of relevance to the forthcoming WSIP-I. These included SIDA and its Social Development Cell, AWBs, NDP Sindh, Farmer Organization Council, office bearers of FOs, NGOs and local water-related farmer's groups, including landowners, leaseholders and *haris*.

2.3 Broad-Based Village and Farmer Organization (FO) Selection Criteria

The ISEA used multiple criteria for selection of sample areas that can truly represent socio-economic, agricultural, technical, and environmental characteristics of the project area. Given these considerations, the specific selection criteria for the districts and villages were as follows:

A. District Selection

For the ISEA to have a comprehensive assessment of the project area, all three AWBs were covered. In addition, the ISEA also included another district on the right bank canal to be used as a control group. To be complete, the ISEA also needed to cover districts affected by flooding in the coastal regions of Sindh and along the Indus River. In view of the above, the following areas/districts were selected for further study in the ISEA:

1. Ghotki Sub-Division (AWB-1): The area comes under the command of Guddu Barrage and falls within the administrative boundary of former Sukkur Division.
2. Mirpurkhas Sub-Division (AWB-2): The area receives its irrigation water supplies from Sukkur barrage and falls within the administrative boundary of former Mirpurkhas Division.
3. Left Bank Canal (AWB-3): The area receives its irrigation water supplies from Kotri Barrage. It includes Akram Wah and Fulleli in Hyderabad District
4. Right Bank Canal: The area receives its irrigation water supplies from Kotri Barrage, and was used as a control group.
5. Badin: The area comes under the command of Kotri Barrage and falls within the administrative boundary of former Hyderabad division. This is a specified area affected by floods.

Table 2-1
Selection of districts as focus groups

S/N	Areas covered	Number of canals/FOs	Selected area sizes
1	Ghotki Feeder	1+1 (canal)	CCA under 2000 acres CCA between 2000 and 5000 acres
2	Left Bank Canal	1+1 (canal)	1 medium (Control Group) CCA 8000 and above
3	Nara Canal	6 (canals)	1 canal with under 2000 acres CCA 3 canals with CCA between 2000 and 8000 acres 2 canals with over 8000 acres CCA
4	Right Bank Canal	2 (canals)	Control Group

Based on this, a representative sample of 10 FOs (hereinafter referred to as villages) across different AWBs was selected (Table 2-1). On average, 10 households were covered from each FO and 20 households were covered from two control groups, resulting in a total of 120 households. The left bank districts outside of these AWBs include Khairpur, Nausheroferoze, Nawabshah, Hyderabad (excluding T. M. Khan), Thatta and Umerkot. The areas thus selected represent all the three barrages in Sindh and all the previous administrative divisions on the left bank area, and thus all cropping zones on the Left Bank. In addition, these areas are sufficiently spaced out from each other to capture the spatial variability in soil type and cropping pattern, and also carry a mix of watercourses rehabilitated under earlier OFWM programmes.

B. Village Selection

Within each selected district, one irrigation channel (minor or distributary) was selected. On each selected channel, two villages were selected keeping in view their locations on that channel (i.e., head vis-à-vis tail). The specific criteria for the selection of villages were based on:

1. Coverage of FOs: The villages selected for the survey and consultations included a mixture of new and old FOs.
2. Drainage: The villages carried variations in terms of coverage of drainage in the area.
3. Ownership pattern: The villages also carried variations in terms of land ownership (i.e. self-cultivation vis-à-vis tenant cultivation).

Table 2-2
Distribution of registered FOs in Sindh across different CCA categories

S/N	Area Water Board	Total # FOs	Number of FOs within a given CCA			
			Under 2000 acres	2000 to 5000 acres	5000 to 8000 acres	8000 and above Acres
1	Ghotki Feeder	12	4	6	2	-
2	Left Bank Canals	12	3	2	2	5
3	Rohri Canal	6	1	0	2	3
4	Nara	163	24	55	26	58
5	Misc. (including BC, KIC, KICC)	3	-	3	-	-
	Total	196	32	66	32	66

2.4 Household Questionnaire

A comprehensive household questionnaire was developed covering the following aspects with regard to pre and post scenarios of the rehabilitation work of the watercourse:

i) Household Profile: covering location, caste/tribe, household size by age and sex, educational attainment, and occupational status of all earning and working members.

ii) Use of Irrigation Water: covering on-farm water management practices in the context of the organization of production (i.e. owner or wage cultivation or sharecropping), constraints encountered, steps taken (individually or collectively) and the outcomes, level of participation in the rehabilitation work, female participation.

iii) Farmers Perceptions: this was based on the perceptions of the farmer with regard to irrigation water supplies, its adequacy in terms of amount, timings, regularity and distribution. It also covered any suggestions made by farmers towards improvements in water management practices at the watercourse and system level, role of irrigation authorities, feudal elites etc. This section also focused on farmer's judgement with regard to rehabilitation work of the watercourse. It further included practices and experiences of user charge recovery where FOs has taken over collection of water charge.

iv) Agricultural Production: covering area and production of crops, livestock etc. and variations in the recent years along with the associated reasons, input and output prices.

v) Health and Environmental Issues: a detailed set of questions on the health status, environmental issues with particular reference to variations in irrigation water supplies caused by the project and impact on the conditions of drainage, access to medical facilities.

vi) Domestic Use of Water: covering specific issues with regard to fetching of drinking water and livestock management particularly focusing on female's role.

vii) Perception of Locals Regarding Local Government Officials: covering perceptions of the local people towards local government officials, their governance, expectations of the locals and the state of their day-to-day affairs.

2.5 Focus Group Discussions

2.5.1 Target Groups

For the focus group discussions, the consultants identified the following Target Groups:

- Stakeholders (responsible for institutional arrangements of water management)
- Women
- Small landowners, sharecroppers/*haris* and tenants
- Medium and large landowners
- Non-agricultural users of water

2.5.2 Basic Characteristics of each Target Group

a) Stakeholders: includes representatives of the institutions directly involved in the water management (i.e., President/Chairman/Secretary of area Water Boards (AWBs), Farmer's Organizations (FOs), & Water Course Associations (WCA), Government Officials of Irrigation Dept., SIDA, Agriculture Engineerig and Water Mgmt. Dept., Local Govt., NGOs, etc.)

b) Women: includes women involved in agriculture and livestock activities, including wives of sharecroppers/*haris* and small landowners cum tenants.

c) Small Landowners, Sharecroppers, Haris, and Tenants: includes sharecroppers/*haris* (landless families), small landowners (< 16 acres) cum tenants, and wage labourers

d) Medium and Large Landowners: includes medium landowners (12.5-25 acres) and large landowners (25 acres and above).

e) Non-agricultural users of water: People in the city who use water for drinking and other purposes (e.g., in Mirpurkhas)

2.5.3 Focus Group Organizations and Discussions

Given the timeframe of the work and general accessibility of the project areas, a total of 6 focus group discussions were carriedout (Table 2-3). The major guiding points for these discussions were as follows:

- Composition of focus groups (8-12 participants): this was designed such that each focus group comprises participants around the same age and socio-economic background to make it as homogenous as possible, with no relatives in the same group discussion.
- Group and transcribed verbatim in the local language and then translated to English. Utmost care was exercised in translating the discussions into English to avoid misconceptions.
- The choice of moderator: this was articulated in such a way that the moderator would be friendly, able to probe in a direct but non-threatening way, who uses easy language and should not influence the responses by stating his/her own opinion, i.e., the moderator must stay NEUTRAL at all times.

It may however be noted here that the guidelines and methodologies were adopted as much as practically possible to the local conditions, social norms and other similar factors which had some impact on the overall organization of the discussions. As a result, a table (Table 2-4) was prepared based on Broad-Based Selection Criteria and detailed discussions among the Consultants' Team of Experts.

Table 2-3
Focus group discussion selections

S/N	Area	Type
1	Left Bank	Small/subsistence farmers
2	NARA	2 medium and 1 large landowner farmers
3	Ghotki	Female
4	Control Group – Sujawal	1 medium landowner farmer
5	Other stake holders - Mirpurkhas	Non-agriculture
6	Badin	Flood affectees

Table 2-4
FOs and their status in each district

S/N	Minor / Distributory	Canal/ Branch/Feeder	FO No.	IDMT	Size	Nearest City
NARA						
1	Daulatpur	West	FO – 16	Yes (2000)	Large	MPK
2	Chahu	West	FO – 18	Yes (2000)	Large	MPK
3	Sanghar Mr.	Dim	FO – 171	No	Medium	Sanghar
4	Hydri Mr.	Dim	FO – 37	Yes (2002)	Medium	Sanghar
5	Bhiri Mr.	Dim	FO – 56	No	Medium	Sanghar
6	Piro Mr.					
GHOTKI						
7	Baiji Mr.	Ghotki	FO – 117	No	Medium	Panu Aaquil
8	Jumas Mr	Ghotki	FO – 194	No	Small	Panu Aaquil
LEFT BANK						
9	Mubarak Wah	Fulleli	FO – 26	Yes (2003)	Large	T.M. Khan
10	Abri Wah Control Group					T.G. Haider
CONTROL GROUP						
11	Ghulel Wah	K.B. Feeder			Medium	Thatta
12	Matla	Pinyari			Large	Sujawal

2.6 Consultations and Disclosure

In addition to focus group discussions, and surveys and collection of data, extensive consultations were carried out with stakeholders during the course of project design and assessment of its possible social and environmental impacts. First round of consultations were carried out after preparation of the first draft of ISEA report in September 2005. Summary of this was also translated in Sindhi and disseminated in the project area, and used during the consultations. Workshops and seminars were held in Ghotki, Badin and Mirpurkhas on January 16, 19 and March 29, 2006, respectively. All these workshops were participated by a large number of representatives of AWBs, FOs, prominent farmers, local NGOs and civil society. Information on the project objectives, components, potential environment and social impacts and proposed mitigation measures was provided to the participants and their views sought. The feedback from these consultations helped in project design. The ISEA was disclosed widely after the consultations meetings. The second round of consultations was carried out on October 6, 7, and 9, 2006 in Ghotki, Badin and Mirpurkhas, respectively. The main focus of these consultation was to obtain feedback from vulonerable groups including ethnic minorities, haris and daily waged labourers.

The first draft of the ISEA was placed in Bank's InfoSop on December 12, 2005. Following the second round of consultations, the ISEA was revised in October 2006. The summary of the final report is translated in Sindhi and disclosed at key district offices. The ISEA main report and its summaries in English and Sindhi are being placed at SIDA website. The Final ISEA and the Summary is submitted to the Bank on 22 November 2006.

POLICIES AND LEGAL ENVIRONMENT

In light of the policies mentioned in the proceeding chapter, a brief review of each and its applicability vis-à-vis the Sindh WSIP-I project is presented below:

3.1 National Environmental Guidelines and Legislation - Pakistan Environmental Protection Act 1997

The Pakistan Environmental Protection Act, 1997 (PEPA) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The PEPA is broadly applicable to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste. Penalties have been prescribed for those contravening the provisions of the Act. The PEPA (as of August 2000) categorizes projects based on **policy and guidelines required for filing, review and approval of environmental assessments** as follows:

i). Environmental Impact Assessment (EIA) - Projects identified in Schedule A.
ii). Initial Environmental Examination (IEE) - Projects identified in Schedule B.
iii). Not requiring EIA or IEE - Projects identified in Schedule C.

The Physical works of the WSIP consist of rehabilitation and improvement of minors, distributaries and canals, which fall under Schedule "B" according to PEPA. Nonetheless, detailed environmental assessment of the WSIP-I sub-projects which consist of rehabilitation and improvement of minors, distributaries and canals, will be done at their detailed designing stage and EA reports will be submitted to Sindh EPA if required. On the other hand, package/contract would be submitted to Sindh EPA if the distributary/minor improvements are on channels located within or proximity to the protected area. In case of main/branch canals improvements consisting of large contract, each EA would be submitted to Sindh EPA.

3.2 Sindh Wildlife Protection Ordinance, 1972 and Amendments of 2001

This ordinance provides for the preservation, protection, and conservation of wildlife by the formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance. The ordinance also specifies three broad classifications of the protected areas:

a) National Parks - Hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park
b) Wildlife Sanctuaries - Wildlife Sanctuaries are areas that are left as undisturbed breeding grounds for wildlife. Cultivation, grazing and residing is prohibited in the demarcated areas. Special permission is required for entrance of general public. However, in exceptional circumstances, these restrictions are relaxable for scientific purpose or betterment of the respective area on the discretion of the authority.
c) Game Reserves - Game reserves are designated as areas where hunting or shooting is not allowed except under special permits.

3.3 The Sindh Water Management Ordinance 2002

The Government of Sindh has promulgated the Sindh Water Management Ordinance 2002 (SWMO 2002) on October 26, 2002. SWMO 2002 provided a framework for institutional reforms in water sector by decentralizing the water resources management and irrigation and drainage services. Under the SWMO 2002, SIDA has been established at the provincial level for overall water resources management with a board coming from stakeholders. Similarly, the AWBs are established at the canal command level, and FOs at the distributary/minor canal level consisting of water user's associations at the watercourse level. SIDA also has environmental and social unit that would be strengthened under WSIP to enhance SIDA's capacity in participatory planning and mainstreaming environmental issues in development and management of the water resources. SIDA would also be involved in addressing the social and environmental issues under the project and through monitoring arrangements ensuring that they are implemented properly.

3.4 The Convention on Wetlands of International Importance, Ramsar 1971

Pakistan is a signatory to the *Ramasar* Convention. The principal obligations of contracting parties to the Convention are:

- To designate appropriate wetlands to the List of Wetlands of International Importance.
- To formulate and implement planning so as to promote wise use of wetlands, to produce an EIA before transformations of wetlands, and to run national wetland inventories.
- To establish nature reserves on wetlands and provide adequately for their wardening and through management to increase waterfowl populations on appropriate wetlands.
- To train personnel competent in wetland research, management and wardening.
- To promote conservation of wetlands by combining far-sighted national policies with coordinated international action, to consult with other contracting parties about implementing obligations arising from the Convention, especially about shared wetlands and water system.
- To promote wetland conservation concerns with development aid agencies.
- To encourage research and exchange of data on wetlands.

So far, 19 sites in Pakistan have been declared as wetlands of International Importance or *Ramsar* Sites. Since the specific locations of the project rehabilitation and improvement are not yet identified, it cannot be determined at this point whether or not any *Ramsar* site would be encountered during the execution of works. WSIP study however has analysed the impacts, if any, of distributary and canal lining on any nearby wetland in more generalized terms.

3.5 Land Acquisition Act 1894

1.The present general law for acquisition of land for public purposes, the "*Land Acquisition Act*" was introduced in 1894. This Act is the principal statute laying down the framework for the exercise of the right of eminent domain of the State. The land acquired under the Act is vested in the Province and is only thereafter that the Province may transfer it to someone else.

2. In addition to the provisions of the Act, regulations setting out the procedure for land acquisition have been provided in the "*Sindh Land Acquisitions Rules*, 1983". These rules are applicable in the province of Sindh.

3.5.1 Review of the LA Act. A review of the keyt features of the 1894 Act is given below.

1. Under Section 4, it causes the publication of a preliminary notification notifying that the land is needed for a public purpose. This permits entry, survey and investigation of the land in question by an authorized Government servant. He shall pay compensation for any damage caused by such entry.

2. Under Section 5, a formal notification is issued that the particular land is needed for a public purpose. This notification is published in the official Gazette and the Collector is required to cause public notice to be given of the substance of the notification. Issuance of Section 5 has to take place not later than one year after notification of Section 4.

3. Any person interested in any land which has been notified under Section 5 may, within thirty days after the issue of the notification, object to the acquisition of the land under Section 5-A. The Collector shall hear the objection, make necessary inquiries and submit a report within 90 days to the appropriate government authority. This authority must announce his decision which shall be final, within 90 days, otherwise the objection shall be deemed to have been admitted and the acquisition proceedings will come to an end.

4. When the Provincial Government is satisfied, after considering the report, if any, made under Section 5-A, that any particular land is required for a public purpose, a declaration to that effect shall be made by an authorized officer of the Provincial government under Section 6. This should follow within six months of the publication of the Section 5 notification.

5. After the declaration under Section 6, the Commissioner shall "direct the Collector to take order for the acquisition of the land" under Section 7.

6. The Collector has then (Section 8) to cause the land to be marked out, measured and planned (if this was not done after Section 4).

7. Under Section 9, the Collector gives notice to all interested people that the Government intends to take possession of the land and if they have any claims for compensation that they be made to him at an appointed time.

8. Section 10 delegates power to the Collector to record statements of persons possessing any interest in the land or any part thereof as co-proprietor, sub-proprietor, mortgagee, tenant or otherwise.

9. Section 11 enables the Collector to make inquiry into "measurements, value and claim and issue the final award." Included in the award is the land's true area, his view of what compensation is warranted, and the appointment of that compensation to all interested people.

10. Though this section is the one that contains the final award, there are two other sections (Section 23 and Section 24) which appear as later sections in the Act but which chronologically actually take place prior to Section 11. This is because these two sections pertain to compensation and the criteria to be followed (Section 23) or not to be followed (Section 24) in arriving at appropriate compensation.

11. Section 23 includes such items as the market value of the land at the time of notification of Section 6, and various damages that may have been sustained at the time possession was taken.

12. Matters to be neglected in awarding compensation (Section 24) include such items as the degree of urgency which led to the acquisition, any disinclination of the person interested in the land to part with it, any expected increase in value of the land from its future use, etc.

13. When the collector has made an award under Section 11, he will then take possession under Section 16 and the land shall thereupon vest absolutely in the Government, free from all encumbrances.

14. Section 18 pertains to persons still dissatisfied with the award who may request the collector to refer the case to the Court for determination and decision. This does not affect the taking possession of the land.

15. In cases of emergency, where the Board of Revenue considers it expedient to take possession of any land at any time before an award under Section 11 has been made, it shall notify this fact in writing to the Collector intimating in addition the date by which the land is required by it.

16. Under Section 17, the Collector can, after causing a notice to this effect to be served on the person or persons interested in the land, take possession of the land subject to the liability of any amount which may be incurred on account of the acquisition.

3.5.2 Definition of Entitlement under the Land Acquisition Act

1. The Act provides (Section 11) that the award shall state the compensation for "persons known or believed to be interested in the land." Similarly, Section 31 of the Act states that on making an award under Section 11, the Collector shall tender payment of the compensation to "persons interested" entitled thereto according to the award.

2. In the Act, the persons interested includes all persons claiming an interest in compensation to be made on account of acquisition of land.

3. The overall position is clarified in Paragraph 62 of the Standing Orders 28 which states:
"It should be noticed, however, that under the present Act no person can claim compensation unless some land has been taken in which he claims interest, or over which he has an easement. He cannot claim compensation on general grounds that his land is injuriously affected by the acquisition if no part of it is taken under the Act."

4. The Act thus provides for payment of compensation only to PAPs who have a legal interest in the land.

3.5.3 Valuation of Land Compensation

1. Under Section 23, the matters to be considered in determining compensation are as follows:

- Market value of the land.
- Damage sustained by the person interested by taking of any standing crops or trees.
- Damage sustained by persons at the time of the Collector's taking possession of the land.
- Damage sustained by the persons at the time of acquisition of land injuriously affecting his other property, movable or immovable.
- If compelled to change his residence or place of business, the reasonable expenses incurred for such change.
- Damage resulting from diminution of profits of land from declaration to actual taking possession by the Collector.

2. Furthermore, an additional sum of fifteen percent of the market value of the land is to be paid in consideration of the compulsory nature of the acquisition.

3. Paragraph 61 of the Standing Order 28 provides guidelines for determination of the market value, including consulting "respectable people who are disinterested."

3.5.4 Land for Land Compensation

1. Under the Act, the person whose land is being acquired cannot be compelled against his wishes to accept compensation in any form other than cash. However, Section 31 of the Act provides that the collector can, instead of awarding cash compensation in respect of any land, make any arrangement with a person having an interest in such land, including the grant of other lands in exchange. Where practically feasible, and if the PAP so desire, a formal consensus agreement will be entered into with those PAPs losing land opt to pay part of their cash compensation for land made available by the collector.

3.5.5 Time Frame for Payment of Compensation

1. The Land Acquisition Act provides that, when the Collector has made an award under Section 11, the Collector shall before taking possession of the land, tender payment of the full amount of compensation awarded by him to the persons entitled thereto under the award. Thus the compensation will be paid to the PAPs prior to possession of the land being taken by the implementing agency.

2. If the persons entitled to compensation under the award shall not consent to receive it, or if there be any dispute as to the title to receive the compensation or as to the appointment, the Collector shall deposit the amount of compensation in the Court to which a reference under Section 18 would be submitted.

3.6 The World Bank Policies and Directives – General Applicability

The Project Concept Document and Draft PAD as well as the World Bank's ISDS discuss in detail the different policies of the World Bank and determine the applicability status of each one (i.e. Triggered or Not Triggered). Table 3-1 shows the status of these policies of the World Bank in relation to the current project before ISEA. Based on the review of potential environmental and social impacts, a brief description of the Bank's policies that would be triggered in the project is provided below:

3.6.1 Environmental Assessment

The World Bank Operational Procedures (OP-4.01) as issued in January 1999 divides projects into 3 categories: Category A, B and C. The WSIP-I would have positive environmental impact by improving the water resources management, reducing waterlogging and salinity and land and water resources degradation. However, during construction there could be some negative effects, which need to be mitigated. Therefore, the Project is classified as Category "A" that would also provide a thorough framework for review and consultations on various interventions proposed under the project in decision-making process.

The Environmental Assessment of the project was carried-out accordingly and an Environment Management Framework is prepared to address any potential impacts during implementation of the project.

Table 3.1
WB Policies – Trigger Status before ISEA

S/N	Policy / Directive	Trigger Status	
1	Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	☒ Yes	☐ No
2	Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	☒ Yes	☐ No
3	Forestry (OP 4.36, GP 4.36)	☐ Yes	☒ No
4	Pest Management (OP 4.09)	☒ Yes	☒ No
5	Cultural Property (OP 11.03)	☐ Yes	☒ No
6	Indigenous Peoples (OD 4.20)	☐ Yes	☒ No
7	Involuntary Resettlement (OP/BP 4.12)	☒ Yes	☐ No
8	Safety of Dams (OP 4.37, BP 4.37)	☐ Yes	☒ No
9	Projects in International Waters (OP7.50,BP 7.50,GP 7.50)	☒Yes	☐ No
10	Projects in Disputed Areas (OP 7.60,BP 7.60, GP 7.60)	☐ Yes	☒ No

3.6.2 Natural Habitat

So far, 54 wildlife sanctuaries and wetlands have been identified in Sindh. Out of this, 34 are in and around WSIP area and 5 have been declared as wetland of international importance (Ramsar Sites). The project works would be limited to rehabilitation and improvement of the existing systems only.

Nevertheless, an EMP would be required for each sub-project and impacts on any Natural Habitat, if any, would be identified along with the mitigation measures in accordance with Project EMF that outlines the broader principles to prepare the protected

area management plan for the physical works within or in the close proximity of any of the protected areas.

3.6.3 Pest Management

The interventions of the proposed project are targeted towards the increased and equitable irrigation water availability through physical rehabilitation and institutional strengthening, which in turn is likely to increase the cropped area/crop production. Increased use of insecticides and pesticides is therefore likely. The likely impacts include potential induced impacts of increased pesticides residue in drinking water, which result in health problems, and the secondary impacts of pesticide residue on women cotton pickers and cultivating vegetable farmers.

A nation wide Integrated Pest Management Program is already ongoing under the auspices of Ministry of Food, Agriculture and Livestock with the help of FAO, in which Sindh Province is actively partaking. Furthermore, a Pest Management Plan (PMP) for Sindh was prepared under another Bank-financed project - Sindh On-Farm Management Project (SOFWMP), which is operational and will reman in effect until its credit closing date of December 31, 2008. Incidentally, the area covered by the two projects (Ghotki, Nara, and Left Bank AWBs) is also the same. Implementation of the PMP would be monitored and supervised under Sindh OFWM Project. By mid 2008 a study would be carried out to assess the status of PMP implementation. If necessary, the WSIP should provide funds for continuing the PMP activities, in particular the farmers' training.

3.6.4 Involuntary Resettlement

Improvement of irrigation and drainage system may cause some adverse impacts, temporary and/or permanent, on private assets requiring limited acquisition of land for civil works. Additionally, there may be a need for small-scale acquisition of land for rehabilitation and improvement of distributary/minor canals to be carried out by FOs. Precise impacts can only be determined after preparation of detailed designs.

The Land Acquisition Rules of 1983 of Government of Sindh, in tandum with Land Acquisition Act of 1894, has set rules and procedures for compensation and / or resettlement. These sets of rules clarify the situation, definition of entitlement, valuation and the time framework under which any land related dispute, arising out of any project activity, can be resolved thereby protecting the rights of the affectees. However, current procedures and provisions of the Land acquisition act of 1894 and the Land Acquisition Rules of 1983 of Government of Sindh are not fully consistent with the requirements of World Bank's OP 4.12. Therefore, a Social Impact Management Framework (SIMF) has been prepared to govern adverse social impacts in the project. The SIMF, summarized in the subsequent section of this report is consistent with the requirements of the World Bank's OP 4.12.

3.6.5 Project on International Waterways

The project is located on and receives water from the Indus River, which is an international waterway. Sindh is located at the lower end of the Indus River basin before it joins the Arabian Sea, which means that any project in Sindh will not have an adverse impact quantitatively and qualitatively on the water share by upstream riparian countries.

4. PHYSIOGRAPHY, CLIMATE AND IRRIGATION SYSTEM CHARACTERISTICS IN THE PROJECT AREA

4.1. Topography

Sindh can be divided into four distinct parts topographically: *Kirthar* range on the west, a central alluvial plain bisected by the Indus River in the middle, a desert belt in the east, and the Indus delta in the south. The project area under consideration lies on the left bank of Indus, spreading from Ghotki in the north to Badin in the south and is located within the central alluvial plains.

a) *Kirthar* Range: The *Kirthar* range consists of three parallel tiers of ridges, which run from north to south with varying width between 20 and 50 kilometres. The range consists of ascending series of ridges from east to west, which are about 4,000 to 5,000 meters high. The hills decrease in altitude from north to south. Towards the south, they spread out in width form a Sindh Kohistan. The *Kirthar* range has little soil and is mostly dry and barren.

b) Central Alluvial Plain: The fertile central plain constitutes the valley of the Indus River. This plain is about 580 kilometres long and about 51,800 square kilometres in area and gradually slopes downward from north to south. It is a vast plain, around 100 meters high above sea level. The lower part of this plain, which starts from Hyderabad is predominantly covered with flood silt. There are a few limestone ridges in this plain. Some of them are near Rohri in Sukkur district commonly known as Rohri cuesta, which extends about 50 kilometres South of Rohri and has an average height of about 75 metres above sea level. Another such ridge is the Ganjo Takkar, a cuesta of limestone, which stretches southward from Hyderabad up to a distance of 25 kilometres. There are also a few depressions and lakes in this plain. According to the past tradition, it has been divided into three distinct zones:

i). Lar or Southern Sindh comprising the areas south of Hyderabad.
ii). Wichalo or Central Sindh, the area lying immediately around Hyderabad.
iii). Siro, or Northern Sindh, comprising the area beyond Naushahero Feroze and Sehwan.

c) Eastern Desert Belt: The eastern desert region includes low dunes and flats in the north, the Achhrro Thar (white sand desert) to the south and the Thar Desert in the southeast. Its major portion lies in India. In the north, it extends up to Bhawalpur division, where it is called Cholistan. With little rain fall and low water table, most of the area is a barren land with scattered stunted throny bushes. In the extreme southeast corner of the desert is Nagar Parkar taluka of Tharparkar district. There is small hilly tract known as Karunjhar hills. These hills are about 20 kilometres in length from north to south and have height of about 300 meters. It consist of granite rocks, probably an outlying mass of the crystalline rocks of the Aravalli rang. The Aravalli series belongs to Archaen system, which constitutes the oldest rocks of the earth crust.

d) Indus Delta: The distributaries of the Indus start spreading out near Thatta across the deltaic flood plain in the sea. The even surface is marked by a network of active and abandoned channels. At a high tide, a coastal strip of 10 to 40 kilometres wide is flooded.

These areas contain some mangrove swamps. The Project area of SOFWMP (i.e. the three established AWBs) lies in the central alluvial plain, which is the main irrigated area of the Sindh Province. Irrigation map of the province of Sindh with AWB demarcation is attached as Map 4.1.

The climate of Sindh is arid and hot. According to classification made by UNESCO, the region has been divided into three zones:

(i) Coastal- South of Thatta.
(ii) Southern- from Thatta through Hyderabad to Nawabshah.
(iii) Northern-from Nawabshah to Jacobabad.

In an average year, coastal region receives a maximum rainfall of 175-200mm. The hottest region is in the northern where mercury during summer goes upto 53°C. The wind direction changes from west to southwest in the Coastal zone, to south-southeast in northern zone. The coldest season extends from December to February when dominating influence is the eastern winds. Mean monthly temperature varies from 20°C near the coast to 14°C in the north. Daily variation is about 30 degrees but temperature above 32 degree or below 2°C may occasionally be expected. Frosts are very rare in south of Nawabshah. Humidities are in the 40-60%. Monthly rate of evaporation in the irrigated areas varies from 76mm in the north to 114mm in the south. Rainfall for the three months is less than 25mm. Mean daily temperature rises rapidly from February onwards to its peak in May and June, rather earlier in the south than in the north. Mean maximum temperature reaches about 24°C in May in the south and as high as 45°C in June in the north. The severity of the heat varies from year to year - the highest temperature ever recorded on the subcontinent was 53°C at Jacobabad. Winds are rather variable, being transitional from the northeast to southwest as the season develops. Humidity is at its lowest generally below 40%, but increases as the sea breeze becomes dominant. Evaporation is correspondingly at its highest exceeding 25mm in rocky desert areas.

July to mid September is the monsoon season and is characterized comparatively by low day temperature, high humidity (over 60% in the south and 50% in the north), reduced evaporation (only 15 or 18mm at some stations in August) and a considerable increase in clouds in coastal areas. Occasional depressions from the east result in a 4 or 5-day period of rain and thunderstorm, especially in the south. Heavy rain is generally rare in the north, which receives little influence either from the monsoon current in the south or from those that come up from the Ganges Valley to the northern Indus plains. The rainfall is very variable; instances have been recorded where a single day has considerably exceeded the highest annual average. Mid September to November is the period of sea breeze with occasional north winds. Temperature rises slightly then falls back in November. Humidity falls to about 10 to 15% of the monsoon level and the evaporation decreases about 100mm in the north, 125mm in the south.

4.1.1. Climate Change

i) Though little is understood in terms of relationship between global warming and its localized impact, yet it has now become an undeniable fact (or perhaps reality) that the relationship not only exists, but is also seen and felt. Among other effects of global warming, the changes in the climatic factors such as temperature and rainfall are most obvious.

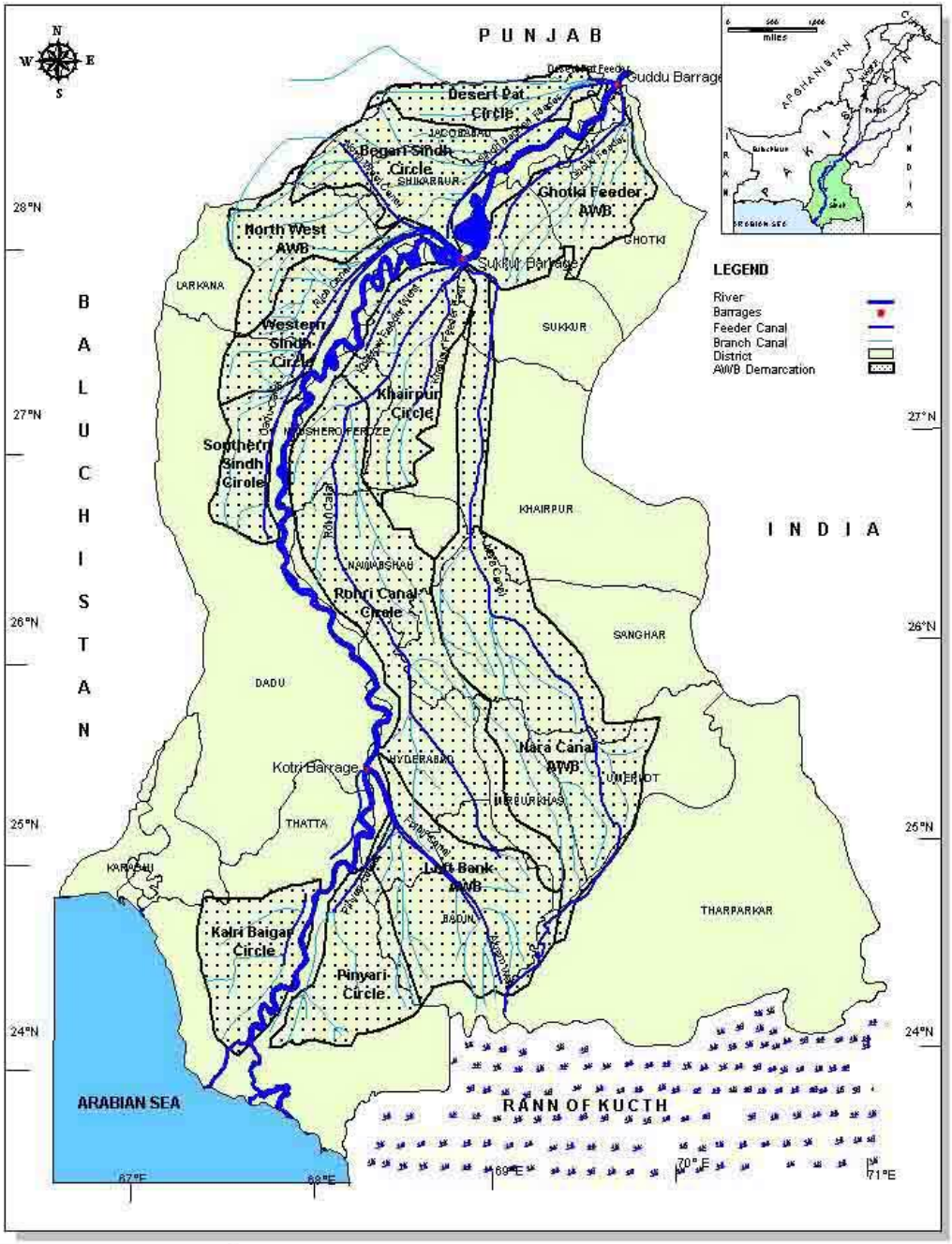
ii) The factors of temperature and rainfall are measured in terms of their timing, amount, regularity and distribution. Both these factors are extremely important

as these create changes in the local environment as well as call for appropriate changes in the policies.

iii) The published data that highlights the months of maximum temperature and annual mean temperature at different locations in Sindh during 1991-2000 show that whereas the hottest months of the year within each location remained largely unchanged during the first half of the decade, these kept shifting backwards and forwards during the later part of the decade. It shows that the annual mean temperature across these locations also increased.

iv) With particular reference to crop agriculture, the process of photosynthesis measured in terms of its inter-temporal variations across months and weeks tends to guide the development of different crop varieties. In the event the process changes, it should be a concern for the agricultural scientists to modify the existing crop varieties (e.g. early or later varieties) in order to remain consistent with the optimal extraction of benefits of photosynthesis. It thus becomes extremely relevant that the policy planners remain aware of such climatic changes and the required resources to be provided. At this, the close interaction between researchers and policy makers can hardly be overemphasized.

MAP -4.1: IRRIGATION MAP OF SINDH WITH AWB DEMARCATION



Client Sindh Irrigation & Drainage Authority (SIDA) Government of Sindh Project Integrated Social & Environment Assessment (ISEA) for Proposed Sindh-Water Sector Improvement Project.	Scale 0 40 80 miles Source N. D. P.	Consultants www.osmani.com OSMANI Engineering - Architecture - Planning - Mapping - Technology Osmani & Company (Pvt) Ltd. 246/2K/6, PECHS,Karachi - 75400,Pakistan Tel: (92-21) 4546541-2 Fax:(92-21)4534691

v) In a water deficient area like Sindh, the rainwater is considered a great resource in raising agricultural productivity and for other human uses. However, the pattern of rainfall is too erratic in Sindh. The erratic pattern reflects its inconsistency with crop water requirements making it productive at times and a waste at other times. In such a scenario, the development of appropriate technologies to harvest rainwater would be extremely relevant. The small-scale water storage options are undoubtedly environmental friendly.

vi) The fundamental issue of raising public awareness to play a role in improving environmental quality should also be noted. The process of advocacy through formal and informal arrangements could play a pivotal role in increasing public awareness.

4.2. Irrigation and Drainage System

Irrigation has been practiced in Sindh since 5,000 years based on inundation canals and floods. However, the history of modern irrigation system with controlled canal systems is rather recent (70 years old). The first barrage (i.e. Sukkur Barrage) was commissioned in 1932 followed by Kotri and Guddu Barrages in 1955 and 1962, respectively. These three barrages command a total area of 6.046 million hectares at present. This also includes a smaller area that is in Balochistan province. Under these barrages, a total of 5.186 million hectares (over 80 percent of the cultivated area in Sindh) is irrigated (Table 4.1).

Table 4-1
Proportional (%) Barrage-Wise Command Area and Irrigated Area in Sindh

Barrage	1996-1997		1997-1998		1998-1999	
	Command Area	Irrigated Area	Command Area	Irrigated Area	Command Area	Irrigated Area
1. Guddu	20.0	20.5	17.0	17.0	21.0	15.9
2. Sukkur	53.0	52.7	60.6	59.8	55.4	59.6
3. Kotri	27.0	26.8	22.4	23.2	22.7	23.5
4. Sindh	**4.360***	**4.559***	**5.463***	**5.099***	**6.046***	**5.186***

* Area in millions of hectares.

Source: Development Statistics of Sindh, 2001 (p.71).

The irrigation network consists of 14 main Canals, 1,446 distributaries and minors and 42,000 watercourses having a combined length of 75,000 miles. Out of 14 main canals, five canals are on the Right Bank and 9 canals are on the Left Bank of the Indus River. The culturable command areas (CCA) of the canals differ significantly. Rohri canal covers the largest CCA and the K.F.west the smallest CCA. Rice Canal and *Beghari* Feeder on the Right Bank and *Pinyari* and *Phullelli* on the Left Bank were originally non-perennial canals. However, except Rice canal, the other three canals have been converted into more or less perennial systems. Table 4.2 shows the current status of designed discharge (cusecs) at Guddu, Sukkur and Kotri barrages' head regulators and the number of minors, distributaries, watercourse, and canals served. Given the infeasibility of groundwater resources for irrigation, which is deteriorating over time (caused by increased salinity and alkalinity) and highly erratic rainfall distribution in time and space, the canal water supplies are accorded the status of life-blood in Sindh. Yet, the ever deteriorating

irrigation infrastructure and management system has rendered the surface irrigation system incapable to meet the day's call to provide irrigation water to farmers in an efficient, equitable and sustainable way.

There are 13 surface drainage systems in Sindh (length 3000 miles) serving about 6.2 million acres of land. Subsurface drainage system serves another 0.1 million acres. About 20% of this canal command suffers from waterlogging and salinity.

Table 4-2

Current Status of System Discharge

S/N	Barrage/Canal Name	Designed Discharge (cusecs)		Number of Minors/Distributaries	Number of WC/Canal
		Left Bank	Right Bank		
A. GUDDU BARRAGE					
1	Ghotki Feeder	8403	-	64	3733
2	Sindh Beggary Feeder	-	14764	85	3902
3	Desert Pat Feeder	-	13140	45	51
B. SUKKUR BARRAGE					
4	Rohri Canal	10887	-	283	4797
5	Nara Canal	13649	-	163	6471
6	K.F. East	2100	-	123	1648
7	K.F. West	1894	-		1360
8	N.W.Canal	5152	5152	127	2460
9	Rice Canal	-	10658	90	2733
10	Dadu Canal	-	3150	120	1578
C. KOTRI BARRAGE					
11	Akram *Wah*	4100	-	48	1993
12	Phullelli	14350	-	75	3931
13	Pinyari	12763	-	113	3507
14	K.B.Feeder	-	9100	110	2637
	TOTAL			**1446**	**42314**

Source: Development Statistics of Sindh, 2001 (p.71).

4.3. Groundwater

One of the impeding factors for the irrigated agriculture in Sindh is the brackish groundwater. More than 80% of the irrigated land in Sindh is underlain with brackish water unfit for agriculture. The shortage of irrigation water coupled with drought

conditions in Sindh has increased the importance of groundwater exploitation wherever fresh water is available. Fresh groundwater is found mostly in a strip parallel to the left bank of Indus River and some pockets in other areas. More than 30,000 tube wells in private and public sector are installed for agriculture purpose. Rapid development of groundwater by private sector is endangering groundwater sustainability by further lowering the water table and inviting intrusion of saline water into fresh water aquifer. The alluvium, which predominantly consists of sand of various grades constitute an extensive groundwater reservoir in Pakistan. The aquifer found at shallow depths is extensive, well assorted and highly transmissive (Table 4.3).

Table 4-3

Groundwater Yields in Sindh

S/N	Area	Yield in m^3/hr Depth to 150 m	Regime
1	Badin	50 – 100	Moderately thick and extensive aquifer
2	Thatta	100 – 300	Fairly thick and extensive aquifer
3	Nagar Parker	10 – 50	Aquifer of limited thickness and extent
4	Chachro	10 – 50	Aquifer of limited thickness and extent
5	Umerkot	100 – 300	Fairly thick and extensive aquifer
6	Hyderabad	100 – 300	Fairly thick and extensive aquifer
7	Mirpurkhas	100 – 300	Fairly thick and extensive aquifer
8	Khokara Par	10 – 50	Aquifer of limited thickness and extent
9	Sanghar	100 – 300	Fairly thick and extensive aquifer
10	Nawabshah	100 – 300	Fairly thick and extensive aquifer
11	Dadu	100 – 300	Fairly thick and extensive aquifer
12	Larkana	100 – 300	Fairly thick and extensive aquifer
13	Shikarpur	100 – 300	Fairly thick and extensive aquifer
14	Jacobabad	100 – 300	Fairly thick and extensive aquifer

The SMO (South) - WAPDA monitors the depth to groundwater in the irrigated areas of Sindh. The quality of groundwater is determined by its chemical and biological constituents and is the result of processes and reactions that have acted upon the water from the moment it condensed in the atmosphere to the time it is discharged by a well or spring. If the water has moved long distance through aquifers or if it has been stagnant between aquicludes, the salt contents may become high. Dissolved salts in groundwater primarily consist of Na, Ca, Mg, K, Cl, SO4, CO3 and HCO3. Concentrations of given elements or ions are normally expressed in milligrams per liter (mg/l) or in parts per million (ppm) by weight. The groundwater quality monitoring in Sindh Province is being carried out by WAPDA – SCARP Monitoring Unit wherein approximately about 1200 private tube wells are being monitored on a regular basis. The results of this limited monitoring are shown in Table 4-4.

According to the USDA classification for irrigation water, usable or 1^{st} class irrigation water contains salts <750 ppm, marginal or 2^{nd} class irrigation water contains salts between 750 -1200 ppm and 3^{rd} class or hazardous irrigation water contains salts more

than 1200 ppm. However, this limited monitoring may not establish the provincial level groundwater quality. A broad-based water quality map for the Sindh Province was however developed by the Consultants based on the Ground Water Quality Map of Pakistan in which the only demarcation of groundwater is fresh or saline. (See map 6.1, Chapter-6).

Table 4-4

Groundwater Quality in Scarps – Sindh

S/N	Area	Usable %	Marginal %	Hazardous %
1	North Rohri	73	21	6
2	Sukkur R. Bank	93	5	2
3	Khairpur	45	19	36
4	Larkana	84	12	4
5	Shikarpur	91	7	2
6	Sukkur	80	20	0
7	Ghotki	97	3	0
8	South Rohri	73	16	11

4.4. Access to Water

The agricultural expansion and water accessibility in last several decades has decreased mainly due to reduced surface waters in canals and increased waterlogging and salinity in arid/semi arid conditions in Sindh. Due to age and poor maintenance of the irrigation infrastructure, weak irrigation management and institutional capacity, irrigation efficiency (both delivery and application efficienies) has decreased manifolds, resulting in reduction of available water for crops, especially at the tail-ends, and contributing to waterlogging and salinity at others. The situation is further aggravated in areas where groundwater cannot be used for irrigation due to poor quality brackish water. Thus, the water accessibility is a major concern for farmers and local villagers. Social surveys and studies have identified the correlation between the poverty distribution and tail command areas of the irrigation and distribution system. The fresh shallow water depth is generally found in proximity of major canals and distributaries and therefore the water accessibility of both surface and groundwater in those areas is conveniently available. On the other hand, the distributaries at the tail command areas show low agriculture production mainly due to inaccessibility to fresh surface and groundwater.

Political and economic power and ethinic status do also play great role in water accessibility in Sindh. Powerful and rich farmers always get more water while poor and marginalized farmers get the least. Such is the cause for rich farmers to get richer and those who are poor grow poorer. A different paradigm shift in terms of irrigation water management and entitlement should be envisaged to rightfully apportion this scarce resource to all beneficiaries.

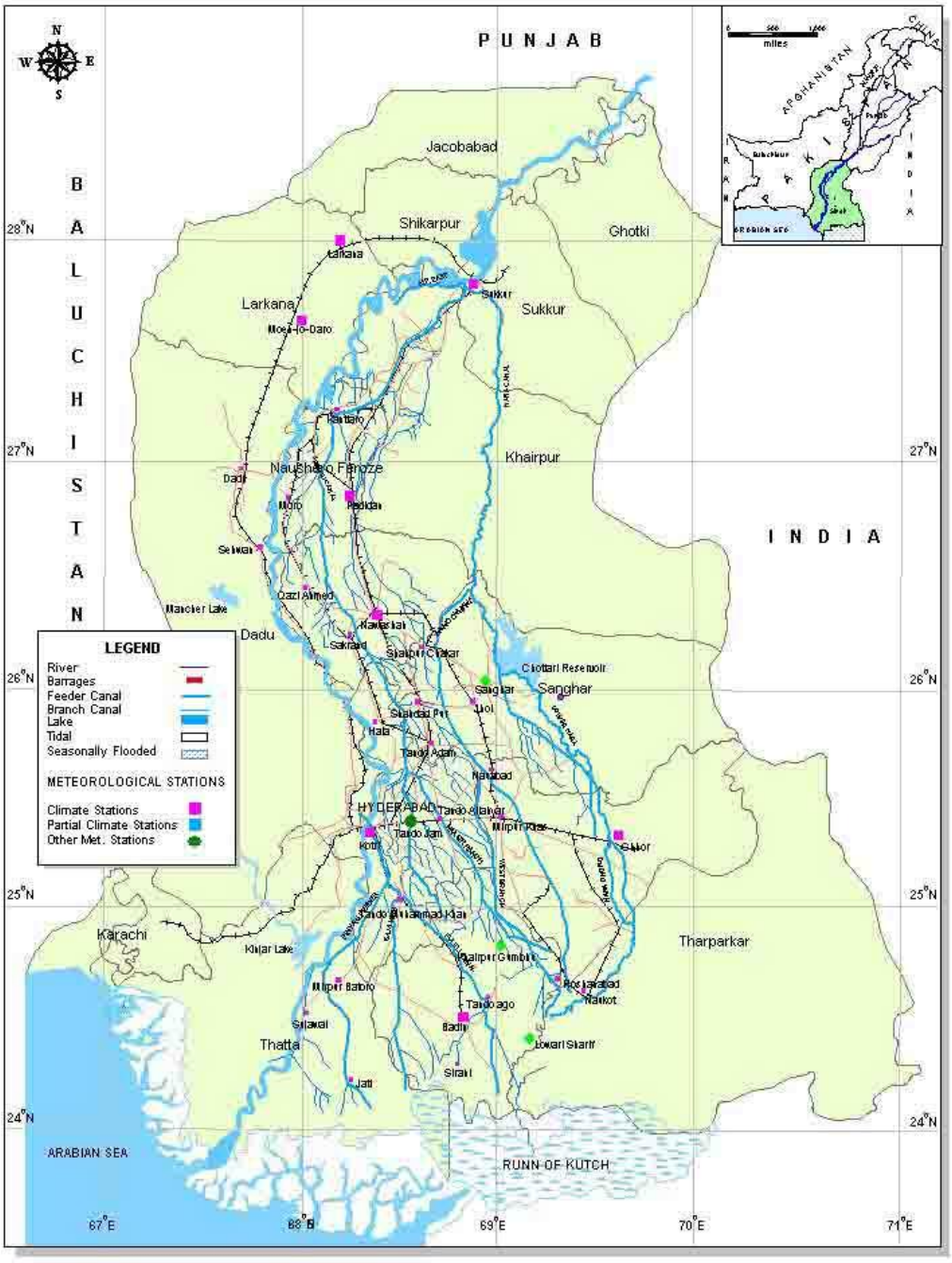
4.5. Waterlogging and Salinity

Sindh has arid climate with very high evaporation and little or no rainfall. The natural slopes are extremely mild, and thus natural drainage is very limited. In addition, natural drainage is also obstructed by public infrastructure, such as canals, roads, and railways. Network of manmade drains is inadequate. As a result, water seepage from the extensive system of irrigation network (main and branch canals, distributaries, minors, watercourses, and farmers' fields) result in shallow groundwater levels, which gives rise to waterlogging conditions. Waterlogging condition combined with high evaporation due to arid climate accentuates salt accumulation in the root zone – salinity – by mobilizing the salt in the ground to the root zone through a capillary rise. To dilute and leach down the salts, farmers usually apply large quantities of water, which turns into a vicious cycle of higher water application - higher losses – waterlogging - salinity that can only be broken by better drainage and improved water management at all levels in the system. Table 4.5 illustrates proportion of a gross command area with water table shallower than 5 feet. Table 4-5 also shows a spectacular decrease in waterlogging during the drought years between 1999 and 2003.

4.6. Water Availability and Cropping Zone

The irrigation system in Sindh is designed at very low cropping intensity covering more land than available water to meet full water requirements of crops. Thus, the system has been historically a supply-constrained one where water is rationed among its users through *warahbundi* methods.

MAP -4.2: METEOROLOGICAL STATIONS IN SINDH



Client
Sindh Irrigation & Drainage Authority (SIDA)
Government of Sindh

Project
Integrated Social & Environment Assessment (ISEA) for
Proposed Sindh-Water Sector Improvement Project.

Scale
0 40 80
miles

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Tale 4-5
Proportion of waterlogged[2] area in the month of June as percentage of Gross Canal Command Area[3] in Punjab and Sindh Provinces

Province	1995	1996	1997	1998	1999	2000	2001	2002	2003
Punjab	5	5	5	6	6	2	2	1	4
Sindh	31	26	47	38	48	6	7	59	3

Source: i). SCARPS: Monitoring, WAPDA (Lahore) published in Agricultural Statistics of Pakistan, 2004-2005 P-125.
ii). Development Statistics of Punjab, 2000 & 2004 PP-36.
iii). Development Statistics of Sindh, 2000 & 2004 PP. 69 & 71.

Overall allocation or allowances of water are based on consideration for agro-climatic conditions, cropping pattern, etc. for instance, the area on the left bank of the Indus River has cotton and wheat and is given perennial or a year round supply. On the other hand, the right bank of Indus where rice is grown is generally accorded a non-perennial status, and thus gets water supply only during the summer period when river flows are high. Similarly, sugarcane plantation, which started in the 1960's with the establishment of sugar mills, is widely grown in the southern part of Sindh, which is climatically more responsive to sugarcane plantation, which is also accorded a perennial supply.

[2] An area is assumed waterlogged if the depth to water table is less than 5 feet deep.
[3] The Gross Canal Command Area for both provinces across the period 1995-2003 were averaged out at 23.90 million acres for Punjab and 11.43 million acres for Sindh to avoid un-explainable variations in Sindh.

5. WATER SHARING SYSTEMS AND INSTITUTIONAL REFORMS

This chapter covers the traditional water sharing system and the impact of the recent institutional reforms in the water sector as they relate to the Sindh WSIP-I.

5.1. The Warahbundi System and Water Distribution among Head, Middle and Tail Farmers

Given the shortage of canal water supplies in relation to its demand in agriculture, irrigation water has historically been rationed in the Indus Basin. Each farm within the command area of the irrigation system is allocated certain time slots for receiving water based on the size of land owned. This is called *Warahbundi*. Accordingly, at each watercourse the total delivery of water is established and the size of the outlet is determined. The water is supplied around the clock in each season. Each farm receives its share after certain time period. In most areas, this period is defined as one week or 10 days. So the *warahbundi* is based on a weekly or 10 days basis and the water is rationed out to all farmers within the command area.

The irrigation system in the Indus basin is primarily based on gravity system and has historically remained supply limited. Whereas this has caused water availability problems across all irrigated land, there are certain built-in inequities in the system reflected by the fact that farms located at the head reaches receive higher supplies, comapred to tail-enders. Furthermore, the tail-enders have disproportionately higher input in the operation and maintenance at watercourse level, but not at higher levels up in the system (distributary, minor and canal) where distributional decision is made. The location factor at the distributary/minor and watercourse levels in terms of head, middle and tail positions have strong impact on the water availability vis-à-vis farm incomes. With this in view, the SWMO-2002 explicitly calls for representation of tail-enders at the level of FOs, AWB and SIDA, which are all at the higher level than at the watercourse level done previously.

Whereas this system of *warahbundi* has been followed all across the Sindh with certain degree of inefficiency and mismanagement, the persistent drought in Sindh during the last 4 years has disturbed the *warahbundi* system. Currently, the distributaries/minors do not receive water supplies as per historical sanctions from the system as a result of general shortage of water in rivers. Therefore, another layer of rationing (i.e., extended *warahbundi*) has been imposed on distributaries/minors, thereby extending the farm level *warahbandi* to uncertain limits.

5.2. Current Status of Institutional Arrangements and Reforms

Sindh has taken some bold steps in the move towards irrigation and drainage reforms. The long-term goal of the proposed reforms is to ensure farmer's participation in the system at successively higher levels in order that the system of irrigation water is transformed into a demand driven system. The process involved the formation of four distinct bodies: Sindh Irrigation and Drainage Authority (SIDA), Area Water Boards (AWBs) based on the command area of all 14 canals originating from three barrages of the province, Farmers Organisations (FOs) that would control water management (including collection of *Abiana*) within the command area of the tertiary channel (i.e.,

distributaries and minors), and the watercourse association (WCA) at the watercourse level. These reforms were, however, to be completed by 2005 as per SWMO 2002. Though reforms are slower than expected they are a substantial step in the right direction. As the reform program proceeds, there would be a need to make adjustments. Progress in the reform program depends upon the following factors:

1) Participatory, strong, vibrant, equitable representative institutions, WCA, FOs, AWBs and SIDA, and their operation based on the lesson learnt from earlier three phases of On-Farm Water Management Projects, NDP and other projects;
2) The process of electing members at all levels i.e. WCA, FOs, AWBs, and SIDA should remain participatory and transparent;
3) Representation of farmers at AWB and SIDA in such proportions, which help them in taking effective stand on water related issues, and
4) Empowerment of FOs to remain sovereign in fulfilling their obligations by eliminating their dependence on AWB or SIDA for technical matters, such as water distribution and *Abiana* collection. This would also require appropriate legal coverage to establish the required level of empowerment. This empowerment should also include FOs' role in monitoring the pattern of expenditure at AWB level to which the FOs would divert 60 percent of the *Abiana* collected by them as envisaged in the reform.

Autocratic land distribution in Sindh could pose a risk to the institutional reform process and large landowners may have self interest to discourage the broader and meaningful participatory approach to water resources management. This constraint has to be overcome through legal instruments (such as SWMO 2002) and through administrative and social pressures. The following sections present the features of the four levels of institutions and water allocation committees mandated by the SWMO 2002.

5.2.1. Watercourse Level Institutions

Operations at a watercourse are traditionally carried out by the farmers themselves on an informal basis as the watercourse has always been a joint property of the landowners. The institutional reforms are making the joint operation and management of the watercourse a formal one and making it an integral and functional part of the overall irrigation water management system. The two bodies to be formed at grassroots level as per SWMO 2002 are:

i) Watercourse Association (WCA): WCAs are formed at grassroots level and include at least two-thirds of the landowners and leaseholders on that particular watercourse. The WCA is registered in the relevant Farmers Organization (FO) and the Board would consist of three to five elected members from amongst the members of the WCA and one or more appointed officials without voting rights.

The management of the WCA will consist of a Chairman, Secretary and a Treasurer. The WCA would be responsible for the operation and maintenance of the Watercourse as well as equitable distribution of water within the command area of the watercourse. There are already about 7000 WCAs in Sindh.

ii) Drainage Beneficiary Group (DBG): DBGs are formed by group of non-elected farmers who are interested in undertaking voluntary, proactive and self-help initiatives in

connection with the drainage system. The DBG would be formed if at least two third of the number of users of the drainage system, whether landowners or leaseholders agree to form it, and the boundary of the area under DBG would be the catchment area of the drainage system. The DBG would be registered in the relevant Farmers Organization (FO) and the Board would consist of three to five elected members from amongst the members of the WCA and one or more appointed officials without voting rights.

The management of the DBG would consist of a Chairman, Secretary and a Treasurer and its functions would be to operate, maintain, improve and rehabilitate the drainage operations. DBGs have as yet not been formed. It may be noted that this is the first time that leaseholders (one type of tenants) have been recognised as stakeholders.

5.2.2. Farmers Organization (FO)

FOs' formation at the Distributary/Minor level is a major step forward (taking participation of users one step above the watercourse) and a crucial piece of the overall reform program.

FOs are formed if at least two-third of the command area of FO is covered by the WCAs. The General Body of the FO would comprise one representative of each WCAs and/or DBGs on that distributary/minor, duly elected by that particular WCA and/or DBG. The minimum number of members is 21 and if the number of WCAs and DBGs together is less than 21, then they shall elect one equal number of representatives in the General Body to make it comprise at least 21 members.

The Distributaries/Minors have been public properties and managed, operated and maintained by the Irrigation and Power Department (IPD) of GoS. The FO formation and transfer of management of the distributary/minor to the FO is therefore the basic step toward the transformation of the system from a purely government managed I&D system to a participatory management run by water users. The FO would be responsible for the operation and maintenance of the respective minor/distributary as well as collection of "*Abiana*", the service charge levied on the farmers for the supply of surface irrigation water and the provision of drainage. The equitable water distribution within the minor will be the responsibility of the FO apart from carrying out the flood protection works, and drainage and sewerage system conferred on it. The FOs in Nara Canal AWBs have already been collecting *Abiana* since 2001/2002.

The Board of Management of the FO would consist of nine members as follows:
a) **Members elected by the General Body**: this includes the chairman, vice-chairman, secretary, treasurer, and two elected members. It is required that three members out of the above six should be the representatives of WCAs or DBGs at the tail-end of the distributary or Minor, or small farmers.

b) **Ex-Officio, Advisory and Co-opted Members**: includes-

- *Nazims* of *Taluka* having the largest cultivable command area in the FO– Ex-officio Member (without voting right)
- Staff Member (the senior most staff member of FO) – Advisory Member
- Technical Expert in Irrigation & Drainage – co-opted member (without voting right)

5.2.3. Area Water Board (AWB)

This institution is being formed at the level of previous Canal Command Areas and corresponds to one of the major canals of the system. The AWBs would consist of 12 members:

i) A nominated member from SIDA,
ii) A nominated member from local Chamber of Agriculture,
iii) Four elected representatives of the FOs,
iv) Four academicians as co-opted members,
v) *Naib Nazim* or his nominee of the *Zila* having largest area within AWB jurisdiction – Ex-Officio, and
vi) Director of the AWB - Advisory Member and Secretary

The AWBs will be responsible for operation and maintenance of the canal, branch canals, and related infrastructure under the AWB jurisdiction including the drainage system as well as collection of their share of *Abiana* from the respective FOs.

5.2.4. Sindh Irrigation and Drainage Authority (SIDA)

This institution will look after the overall Irrigation and Drainage operations in the province. SIDA will comprise of:

i) Five members nominated by the Government of Sindh including the Chairman and four academicians
ii) Five elected members – one each from FOs receiving water from *Guddu* and *Kotri* Barrages, and three from amongst the FOs receiving water from *Sukkur* Barrage.
iii) Six Ex-officio members including ACS (Dev), Secretaries I&P, Agriculture & Finance Departments, the Provincial Coordinator NDP and the MD SIDA.

The SIDA will control, operate and manage all the three barrages in Sindh and the drainage system assigned to it including spinal drains and the inter-AWB drains.

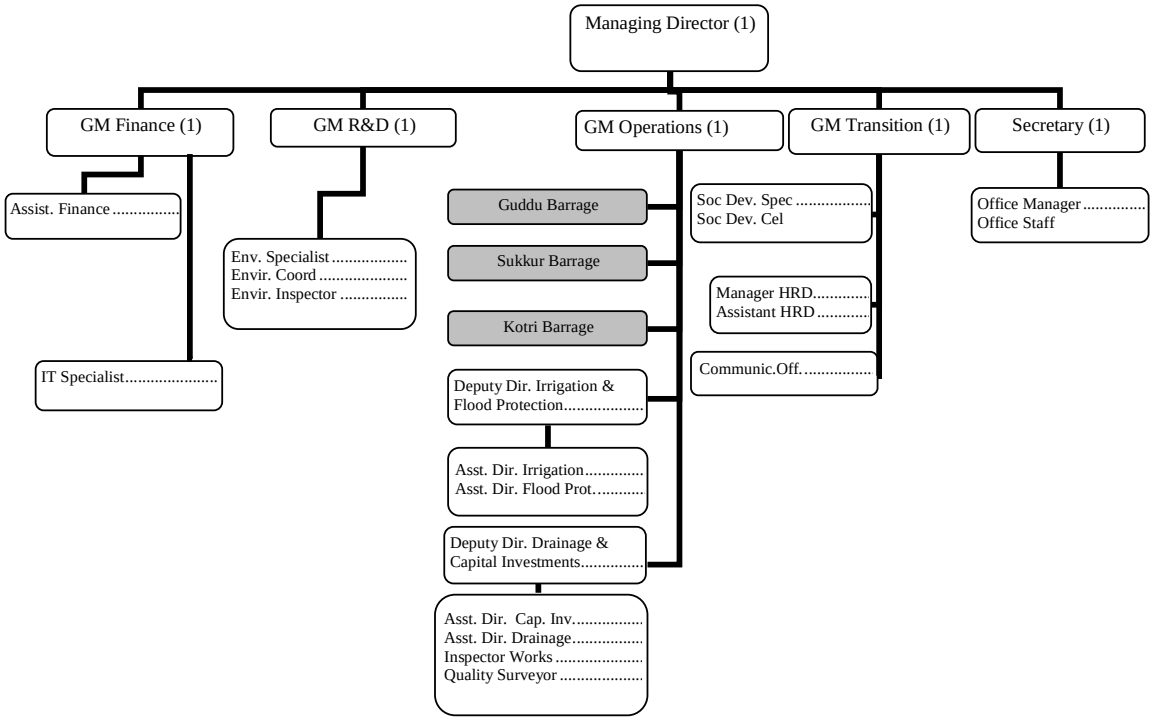
5.2.5. Water Allocation Committees

One of the important aspects of the new ordinance is the introduction of **Water Allocation Committees (WACs)** at each level, i.e. SIDA, AWB, and FO levels. For AWB, there would be one for the whole AWB while an independent WAC will be created for each branch canal area under the AWB. These committees, having good representation of farmers will determine water allocation under their jurisdiction, which may be termed as one of the most important aspects of the new system.

Chart - 5.1

Organisational Chart

SINDH IRRIGATION & DRAINAGE AUTHORITY



5.2.6. Current Status of Institutional Reforms

Under Sindh Water Management Ordinance 2002, the SIDA has been established and functioning though it is still a weak organization, largely dependent on Irrigation and Power Department's technical staff. The WSIP-I would provide necessary assistance in building its capacity to carry out its responsibility of planning, developing, and managing the provincial water resources. Among other things, an Environmental Management Unit (EMU) has been established under SIDA for incorporating environmental considerations in its planning, development and management of water resources. Three AWBs have been formed on Ghotki, Nara Canals and Akram Wah and Fuleli canals.

Perhaps most progress is made on development of FOs. According to SIDA's monthly bulletin of August 2006, a total of 213 FOs have been established in 3 AWBs and 3 Canal Command Areas. Of these 213 FOs where social mobilization has taken place, re-elections took place on 176 FOs. However, the total FOs to be registered in these 3 Area Water Boards is 369 out of which only 213 have so far been registered. As may be seen from Table 5-1, most of these have been formed in NARA AWB where management transfer to 141 FOs has already taken place. The development of FOs is continuing under the Bank supported Sindh OFWM and a National program. It is expected that by the time WSIP-I is effective, FOs would be formed on all distributaries/minors in the project area. The WSIP-I would primarily focus on capacity building of FOs, and enabling them to participate in planning, designing and implementation of project works and in O&M of the system afterwards.

Table 5-1
FO formations and Management Transfer in Sindh

S/N	Area Water Boards / Canal	Total FOs to be Registered (Tentative)	FOs Registered	Management Transferred (IDMT Signed)
Guddu Barrage				
1	***Begari* Sindh Feeder Canal AWB**	85		
2	Desert Pat Feeder	45		
3	***Ghotki* Feeder Canal AWB**	94	17	12
Sukkur Barrage				
4	***Nara* Canal AWB**	170	162	141
7	***Western* Canal AWB *(Dadu 111+ Rice 72)***	183		
8	*Khairpur* Irrigation Circle (East and West Feeder Canal)	123	2	0
9	*Rohri* Canal Circle	283	6	0
Kotri Barrage				
10	**Left Bank Canal AWB *(Phuleli 75+Akram Wah 48)***	105	24	22
11	*Kalri* Beghar Feeder Circle	110	0	0
12	*Pinyari* Circle	113	0	0
Others				
Lift Irrigation River Indus		1	1	0
Total (14 Canals)		**1312**	**213**	**175**

Source**:** SIDA monthly bulletin of August 2006.

5.3. Water Pricing and Cost Recovery

Water charges are levied based on cropped area and type of crop grown as a proxy to the amount of water used with higher rates for crops using more water such as rice and sugarcane. Currently there is no direct linkage between O&M expenditures and recovery of water charges. However, initially water rates were set to recover O&M and part of capital cost of development of the system, and the remaining part of development cost was to be recovered through land betterment charges. Overtime the water charges did not keep up with inflation, and revenue from water charges was barely equal to the O&M expenditures. In early 1970s, after the oil shock and installation of government owned groundwater/drainage wells demanding high O&M expenditures, the revenue from water charges fell below the O&M expenditures of the system. Historically, the collections through water charges (*Abiana*) have not accounted for more than 40 percent[4] of the annual repairs and maintenance cost of the system.

[4] Various issues of the Public Finance Statistics, Ministry of Finance, Government of Pakistan.

This has continued to be the case since then, and lower revenue recovery began to affect government's capacity to allocate adequate O&M expenditures. The system started degrading, resulting in poor service to the users. The willingness of the users to pay higher charges necessary for O&M of the system in the absence of good I&D services also evaporated.

The poor water use efficiency as a result of dilapidated irrigation system also resulted in inequity in distribution, particularly between head and tail-end users. The breakdown in discipline and governance in the irrigation system also allowed influential farmers to illegally pump water out of the canal system, further accentuating the inequity in irrigation water distribution. The minimum cost recovery accompanied by lack of maintenance and additional investment in the irrigation sector, and weak institutional arrangements have combinedly attributed to the current shambles in irrigation system in the Province of Sindh. The way forward to address the problems is to adopt the reform program[5] with participatory irrigation management, which is now constituted through the SWMO 2002. The challenge is to make the legally mandated institutions work on the ground and overcome risks posed by many factors, such as vested interests, lack of governance, and disciple at all levels of the government.

5.4. Current Issues of Relevance to WSIP

In the background of the current legal, policy and institutional environments (where some measures seem to overlap while others duplicate or counter each other), there are a number of issues that are likely to impact on the implementation of WSIP. These need to be considered in the fine-tuning of WSIP and be addressed in the Implementation Framework. These issues can be summarized are as follows:

5.4.1. Lack of Knowledge and Awareness

Issues

- A vast majority of farmers are not fully aware of the formation as well as the autonomy of FOs
- The irrigation authorities also do not posses full and complete awareness with regard to transfer of distributaries/minors to FOs
- There is a lack of understanding between SIDA (Sindh Irrigation & Drainage Authority) and AWB (Area Water Board) on the demarcation of their respective responsibilities.
- It is not clear as to who (AWB or FOs) is responsible for the repairs and maintenance of regulators installed at the beginning of a distributary (or minor).
- There is a complete lack of clarity on the allocation of water across canals.

Actions

- The FOs and farmers in general are not regularly updated on the allocation vis-à-vis warahbundi system and the associated changes made along with the rational for doing so. In order that the water management in the system is based on demand rather than supply of water as an outcome of the institutional changes, the level of awareness to be created among all stakeholders must be considered as a pre-condition.

[5] The reform program initiated following "Pakistan: Irrigation and Drainage Strategy – Issues and Options -1994".

5.4.2. Apprehensions

Issues

- Detailed discussions with FO members reveal that an FO does not carry full autonomy in the collection of *Abiana* (water charges) from the users. In the event some users do not pay *Abiana*, the FO should have the requisite legal status to ensure complete collection. On the contrary, persistent losses in recovery may give rise to problems, which may completely negate the spirit of self-help and organisational efforts.

Actions

- The technical training has not been provided to FOs with regard to the rehabilitation works that are to be undertaken under its framework.
- As part of the autonomy envisaged in the institutional changes for water sector, the FO should also be imparted training in *Abiana* collection. Currently, *AABDARS* (canal *patwari*) who are employees of SIDA are also involved in *Abiana* assessment that negates the empowerment of FOs.
- The FOs need to have magisterial powers in the collection of *Abiana*. Currently, neither the staff of SIDA nor AWB carries such powers. This power primarily rests with the Revenue Department.

The farmers have shown their apprehension with regard to the perceived biases and inequities in imposing extended warabandi at distributary/minor level. This change also caused greater discretionary powers to irrigation administrators. What appears primarily from discussion with various stakeholders is that the system of irrigation at present has become less transparent. The reform package in the water sector being introduced by the government has rightfully established Water Allocation Committees (WACs) at four different tiers of the system with adequate representation of farmers. However, the apprehensions of farmers caused by the current lack of transparency will continue to haunt the effectiveness of the system and pose a serious threat to its long term sustainability.

5.2.1. Representation

- The representation of farmers at the AWB is considered inadequate.
- At SIDA, there are only 5 FO representatives in the body, which has a total membership of 16. It means that SIDA can hold meeting even if FOs for any reason decide not to attend the meeting, or the other 11 members can take decisions which may have been opposed by farmer's representatives.
- Farmer's selection for FO leadership and membership is in practice based on nomination/selection and not on the basis of election as per requirement of institutional reforms.
- There is currently no arrangement to ensure the representation of *haris* and women on the WCAs and FOs.

Actions

- It must be ensured that FOs are formed on the basis of fair and balanced representation
- Measures are needed to ensure the participation of *haris* and womens (at WCA and FO levels in particular) as well as more farmer representatives at AWB and SIDA levels.
- Changes in the composition of the General Body of SIDA are required to increase the proportion of farmers.

5.4.3. Role and Effectiveness of FOs

Issues

- The pace of the institutional changes in the water sector is also slow. As a result, the formation of Farmer Organisation (FO) is currently effective only in the Nara canal command area, where there are a larger proportion of medium size farmers.
- Whereas it is considered essential to empower FOs for community participation and higher efficiency attainment, it is equally important that the FO's performance be evaluated if the goal of transparency is to be achieved.
- It also filtered through discussions that women representation at WCA and FO would not have cultural barriers as it is generally argued.
- Currently, the effective FOs have shown success in *Abiana* collection. However, it was observed that they only collected 60 percent of the revenue target that was passed on to AWB as per SIDA Ordinance of 2002. The remaining 40 percent, which was also to be collected by FOs and managed by them for O&M of the distributary and watercourse was not collected. Since the Ordinance is not clear in making it mandatory for the FOs to collect and control the 40 percent, it may well have happened that the farmers paid only 60 percent of their *Abiana* and pocketed the rest assuming that it is to be spent /controlled by them anyway. Another serious implication could be that the farmers may have deflated the *Abiana* rate by 40 percent to reduce their cost of *Abiana* by taking the shelter of FOs.

Actions

- What needs to be done in this regard is to improve FOs capacity and monitoring procedure to avoid a situation where there may not be any fund at FO level for the O&M of distributary and watercourse. An external audit of FO accounts will help in controlling this evasion.
- At the beginning, a quota for women and sharecroppers at FO would ensure balanced representation. The FOs can then be better endowed to carryout the task of social mobilisation. It would add complimentarity to this effect if the FO Council is empowered. The role of effective NGOs in this respect can hardly be overemphasised.

5.4.4. Relationship Between Landowners and Tenants

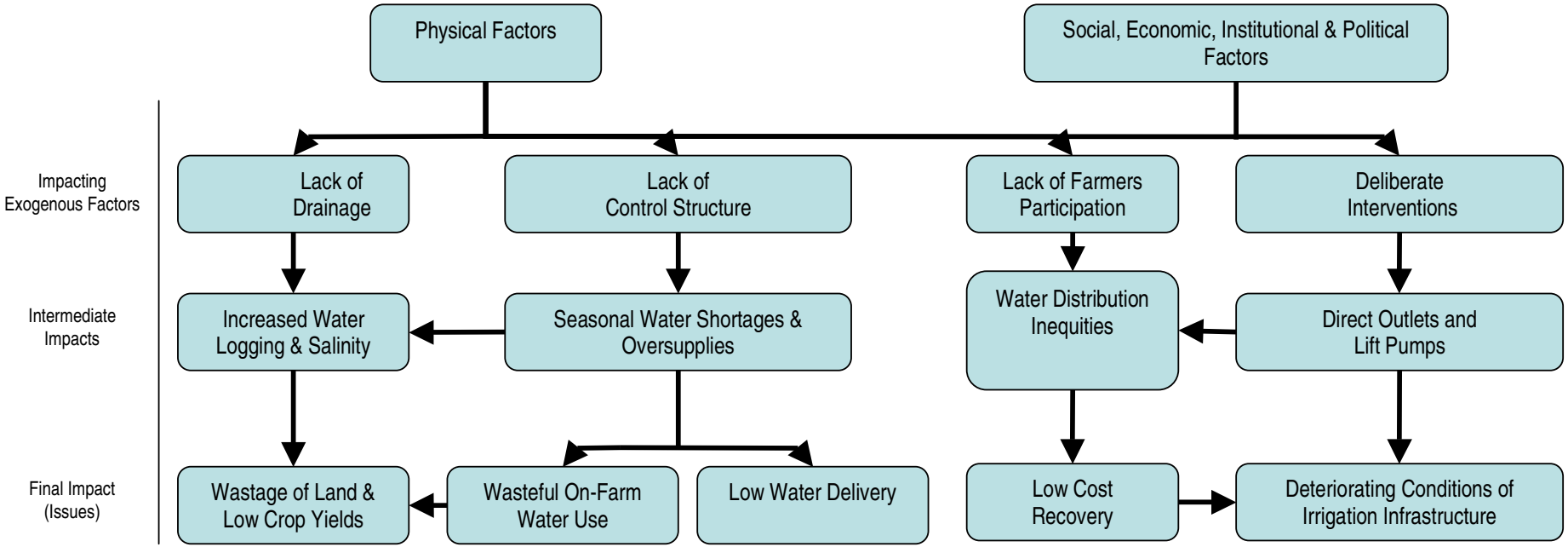
Issue

- The representation of various stakeholders, particularly of tenants at FO is a major issue. The process of social mobilisation is slow and needs to be accelerated particularly in the context of small farmers.

Action

- There is a clear need for capacity building in order that the core aspect of water sector reforms (i.e., community participation) becomes effective. Unless the larger participation of farmers is ensured, the system will not become transparent. Unless the relationship between landowners and tenants improves, the productivity potential reposed in the reform package cannot be fully extracted.

Chart 5-2
Major Issues Affecting Irrigation System in Sindh



6. SUMMARY OF ENVIRONMENTAL ASSESSMENTS

6.1. Background

Sindh contributes about 23% to Pakistan's agriculture economy. Agriculture progress of the province highly depends on the availability and proper management of irrigation water. However, given the dilapidated irrigation sector due mainly to old-aged infrastructure with the lack of proper maintenance, poor irrigation management and lack of institutional capacity, irrigation water delivery in terms of efficiency, equity and reliability has decreased over the years. Some of the major issues faced by the water sector are as follows:

- Institutional weaknesses
- Inadequate storage capacity and high seasonal variation in river discharge
- Low irrigation efficiencies (30-40%)
- Water distribution inequities due to poor O&M, excessive withdrawals by Direct Outlets (DO) and lift schemes on main and branch canals, and illegal withdrawals
- Over-irrigation – due to wrong traditional practices, poorly leveled fields and inappropriate irrigation scheduling.
- Waterlogging and salinity
- Prolonged drought accompanied by water shortages in the system
- Indiscriminate use of chemicals (fertilizers and pesticides) on the farm
- Severe levels of pollutants discharged to canals from industries and domestic/municipal sources.
- Polluted drinking water from canals in saline groundwater areas where canal water is the only source of irrigation.

There are numerous industrial units in Sindh, which are discharging their untreated wastewater into the canals. A typical case that has attracted public attention is discharge of industrial wastewater from Kotri industrial area in to KB Feeder. Similarly, industrial units of Jamshoro discharge their wastewater into Indus upstream of Kotri Barrage and municipal wastewater of Hyderabad flowing into Indus downstream of Kotri Barrage. This is also true for many other towns and villages located along the irrigation canals. Another major issue is improper use of irrigation water resulting in excessive wastage of this precious commodity and low produce per cubic feet of water (water productivity is at 41% to 59% of the global average) and increase in waterlogged areas to the extent that now about 35% of the total irrigated land is waterlogged.

The Sindh Water Sector Improvement Project (WSIP) proposes to address these issues, which would be implemented over a five year period to improve water management with the focus on three areas where AWBs are operational (i.e. Ghotki, Nara and Left Bank). WSIP will improve and modernize irrigation operations and introduce better and integrated water management for irrigation and drinking purposes.

6.1. Physical Interventions under the Project

The following interventions are envisaged under the WSIP-I project:

a) Rehabilitation and improvement of main and branch canals, water measurement and accounting system for improving water management and monitoring;

b) Rehabilitation and improvement of distributaries and minors. This also includes lining of distributaries with geo-membrane where justified technically and economically and can be done without construction a diversion channel; and

c) Improvement of drainage in the FOs areas by rehabilitating structures, cleaning drainage obstructions and debris, etc., and planting trees along the drains.

Physical works are expected during project interventions. Some of these include:

- Earth work, such as digging pits and transportation of earth;
- Geo-membrane lining with concrete cover for selected reaches of Akram Wah and distributaries;
- Transportation of sand, cement and other construction materials;
- Construction/rehabilitation of community structure (washing bays, cattle baths, buffalo crossing, water points, etc.);
- Desilting and removal of silt;
- Repair/installation of gates, flow measuring devices, and other structures; and

On top of these physical interventions, the WSIP-I project would also support the following studies:

- Rehabilitation of Sukkur Barrage: WSIP will provide funds for carrying out an environmental assessment of the Project as well as for preparation of a resettlement plan. Based on the review of these studies, the Bank would consider a standalone project for rehabilitation of Sukkur Barrage.
- Rehabilitation of Guddu Barrage: The Project would provide funds for undertaking technical feasibility studies, hydraulic model studies, environmental assessment of the project, as well as studies for resettlement plan. Based on the review of these studies, the Bank would consider a standalone project for rehabilitation of Guddu Barrage.
- Rehabilitation of Akram Wah Canal: The Government of Sindh is studying the feasibility of increasing the discharge capacity of the canal from current design discharge of 4100 cusecs (the actual discharge due to poor condition of the Canal is 2800 cusecs) to about 6000 cusecs. Rehabilitation of the canal will only be undertaken in later stages after the feasibility of increasing its discharge capacity including its social and environmental assessments are completed.

6.2. Environmnetal Baseline

The study team carried out a comprehensive review of all available information and data relating to the project, comprising project reports, maps, aerial photographs, satellite imagery, and statistics issued by Government of Sindh overtime to establish a good environmental baseline. Out of a large number of documents consulted, some with greater relevance and significance are listed below:

- Environmental study of Sehwan Barrage complex January 2005, WAPDA
- The World Bank Pest Management Guide Book
- Sindh Environmental Quality Standards, Osmani & Company (Pvt.) Ltd, (1994) Revised 2000
- Wetlands International (1997), The Asian Waterfowl Census (1994-96)
- A Directory of Asian Wetlands, Derek A. Scott/WWF/IUCN/ICBP/IWRB, 1989
- Proceedings of Impact of Environmental Pollution on Lakes of Sindh, Sindh EPA and IEEM, MUET, Jamshoro, November 1999

- Pesticides Use and its Impact – Farm Level Survey by National Fertilizer Development Center, 2002
- Biodiversity Action Plan Pakistan, IUCN / WWF, August 1999
- Preliminary Draft Water Sector Strategy and Medium Term Investment Plan – Executive Summary, Halcrow / Arcades Euroconsult, April 2002
- Wildlife of Sindh – In need of Protection and Conservation, Sindh Wildlife Management Board
- Final Report, EIA for Exploration Activities in South West Miano-II Concession, OMV (Pakistan) Exploration GmbH, March 2003
- Final Report, Exploitation and Regulation of Fresh Groundwater, ACE / Halcrow, April 2003
- Sindh Water Management Ordinance – October 2002
- Environmental Impact Assessment of RBOD (Extension) from Sehwan to sea January 2003, MMP Karachi
- Integrated Social Environmental Assessment (ISEA) of an on-going Sindh On-Farm Water Management Project (SOFWMP), Osmani & Company (Pvt.) Ltd., 2003.
- Framework for Land Acquisition of Resettlement, National Drainage Programme-1, January 1996 (Revised May 2001).

6.1.1. Physical Environment

The baseline data presented below cover a large part of the project area from Guddu barrage in the north to Badin in the south.

(a) **Water Resources**

i) Surface water: proper management of surface water can minimize the water shortage problems. Since the river flows are highly variable (88% in Karif and 12% in Rabi seasons), there is an urgent need to build storage to reduce shortage in Rabi Season. The surface water quality for irrigation also decreases along the river from upstream to downstream and from Kharif to Rabi season. For example, in Kotri barrage (the last on river Indus) TDS is about 400 ppm (maximum allowed for irrigation and drinking water are upto 1000 ppm and 500 ppm, respectively) during dry flow and 150 ppm during floods. Surface water from the canals is the only source of drinking water for communities living in the areas where groundwater is saline. Sweet water lakes are also other sources of surface water in Sindh. These include, Manchar, Haleji, Kinjher and Hamal. Table 6-1 provides surface water quality for Manchar Lake and River Indus at Sehwan over a period of one year.

ii) Groundwater: the groundwater potential in Sindh is estimated at about 2.5 MAF/year. Due to continuous drought between 1997 and 2002, the groundwater has depleted fast and fresh groundwater development has reached its potential limit. It was observed during site visits that most of the secondary open surface drains were dry. This has resulted in lowering of water table and reduction in waterlogged areas. In addition, over 50% of the villages in Sindh obtain their water supply from hand pumps installed by private household (I&P Department, GoSindh). However, in saline groundwater areas, irrigation canals are the only source for domestic water supply. Maps 6-1 and 6-2 show the areas with fresh and saline groundwater and depth to groundwater, respectively, under WSIP.

In the public sector, total number of tube wells are 5835, out of which 3697 are fresh water, 1777 are saline water and 361 are scavenger wells. About 25,000 tube wells in private sector pump water for agriculture, and about 70% are pumping saline water, which is likely to cause secondary salinization in the future due to marginal water quality (I&P Department Govt. of Sindh).

iii) Groundwater recharge: The main sources for the recharge of the groundwater aquifer are rainfall, and infiltration from river Indus and unlined canals and through over-irrigation. Approximately, 10% of recharge comes from rainfall, 15% from main canals system, 25% from return flow from over-irrigated fields and watercourses, and return flow from groundwater is 12% and recharge from the river is about 38%.

b) **Drainage and Reclamation**

i) Waterlogged and saline lands: Sindh has serious problems of waterlogging and salinity due to flat gradients, improper water application and poor drainage. The problems of waterlogging and salinity pose a major threat to sustainable agriculture on about 30% of irrigated lands. In shallow and saline groundwater areas, salinity remains at a very high level of 3900-4000 ppm while in fresh groundwater areas salinity was observed at 900 ppm in 1988 and 940 ppm in 1995. The extents of saline areas are shown in Tables 6-2 and 6-3. As shown in Table 6-2, nearly 16% of cultivated land is affected by salinity, whereas entire uncultivated land is saline. Out of a total of 12.815 million acres of CCA, 4.001 million acres (about 32%) is saline and nearly 43% is waterlogged (Table 6-3 and Figure 6-1). Table 6-3 illustrates the extent of waterlogging in Sindh, which is also shown graphically in Figure 6-1.

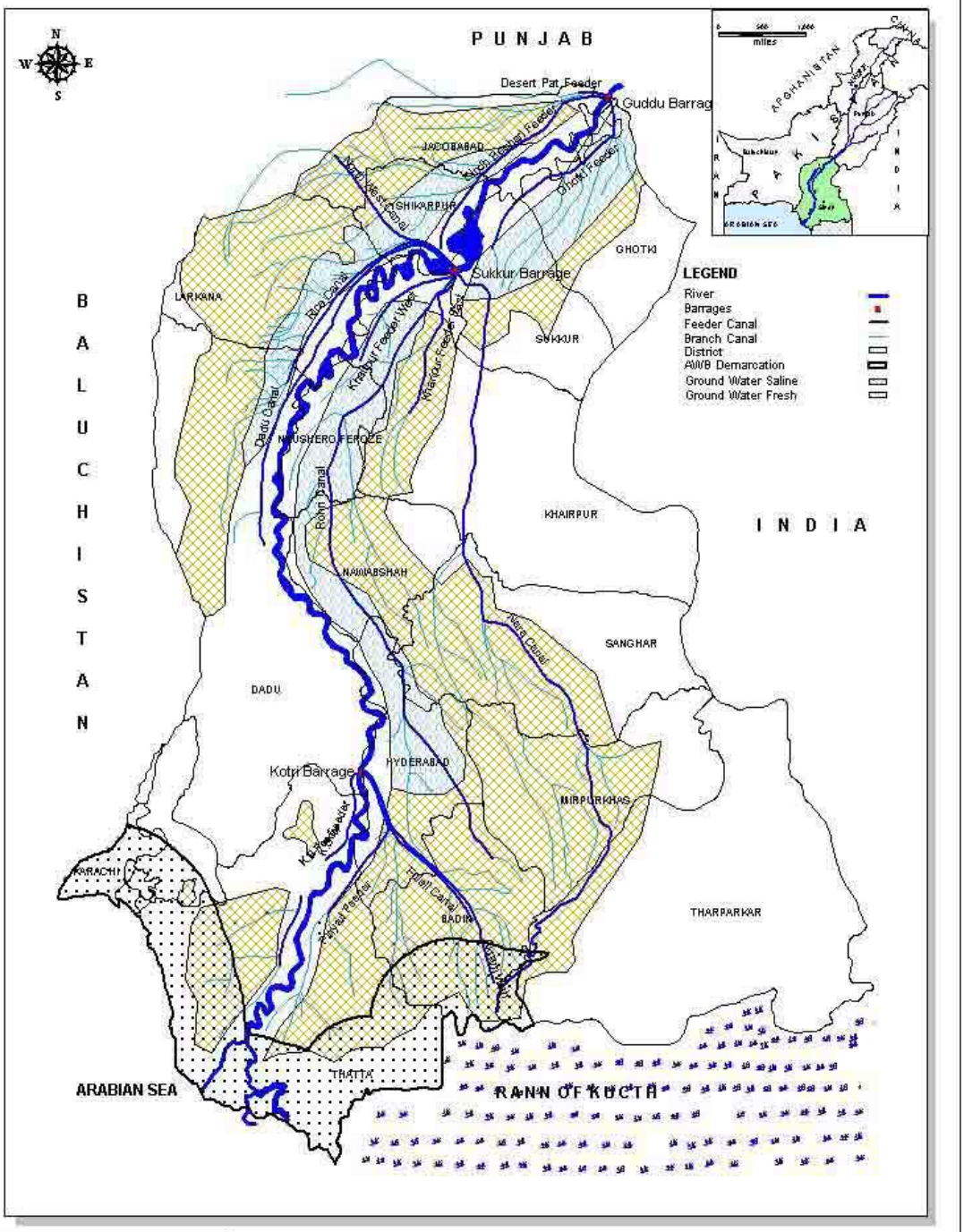
The waterlogged area increased from 1.272 Mha (3.41 Mac) in 1991 to 2.26 Mha (5.58 Mac) in 1992 responding to canal diversions of 50.3 MAF in 1991-92 and dropped to 1.3 Mha (3.212 Mac) in 1994 as the availability reduced to 36.1 MAF. With improved water availability in subsequent years, it again increased to 2.164 Mha (5.347 Mac) in 1997 and 2,205 Mha (5.449 Mac) in 1999. In 1999-2000, due to drastic reduction in available supplies, the waterlogged area reduced to 285,000 ha (704235 acres). The trend is expected to continue in the future and once the supplies increase, the waterlogged area may increase unless mitigation measures are implemented. It is estimated that under average flow conditions, the waterlogged area in the province will be 2.2 Mha or more. Due to the incidences of heavy rains as observed in 2003, the waterlogged area is expected to increase rapidly.

Table 6-1
Water quality data of Manchar Lake and Indus River: Total Dissolved Solids (parts per million)

S/N	Sampling Location	Year	Jan-01	Jan-02	Feb-01	Feb-02	Mar-01	Mar-02	Apr-01	Apr-02	May-01	May-02	Jun-01	Jun-02	Jul-01	Jul-02	Aug-01	Aug-02	Sep-01	Sep-02	Oct-01	Oct-02	Nov-01	Nov-02	Dec-01	Dec-02
1	Manchar Lake at the Tail of Danistar Canal	1989															950	1330	1370	900	730	560	440	570	570	480
		1990	410	580	1040	1330		740	670	740	740	990	1110	1250	1480	230	650	950	2150	1710	106	1100	1090	1000	1060	1210
		1991	1270	1250	1550		2240	1700	1540																	
2	Manchar Lake at the End of MNVD	1989															1310	3360	3510	209		1250	1750	1880	1360	1300
		1990	1250	1560	2730	3400		1400	1400	1400	1480	1700	800	320	380	700	1160	1130	1300	1450	1460	1840	2550	1750	2090	2060
		1991	2480	2460	2460	2020		2820	2280	1820											1980					
3	Manchar Lake at Surface (Center)	1989																								
		1990						650	720	730	930	1020	1310	1020	1430	530	590	580	580	680	720	990	980	1020	1140	1220
		1991	1230	1190	1560		1560	1470	1610	1640																
4	Manchar Late at Depth (Center)	1989																								
		1990						630	530	670	830	860	1180	860	1400	390	560	540	460	550	620	900	900	990	1030	1200
		1991	1200	1230	1420		1420	1570	1540	1620																
5	River Indus at Sehwan	1989															290	380	300	210		230	420	310	540	570
		1990	440	600	560	230		880	250	330	350	160	190	170	150	150	160	160	140	200	240	340	300	450	510	560
		1991	420	470	370	0	500	420	510												220					
6	River Indus at Kotri	1983(1)							296		331		227		180		191		206		221		240		245	
		1984(1)	201		243		265		321		322		261		199		245		233		233		247			
		1985(1)	245		225		225		290		363		183		196		169		193		193		232			
		1986(1)	206		223		267																			
		1990						490	210					150	640		200	170	170	170	170		240			

Source: (i) Indus River Commission Records 1983-86
(ii) RBOD extension Sehwan to Sea (RBOD consultants January 2003)

MAP -6.1: GROUND WATER QUALITY



Client Sindh Irrigation & Drainage Authority (SIDA) Government of Sindh Project Integrated Social & Environment Assessment (ISEA) for Proposed Sindh-Water Sector Improvement Project.	Scale 0 40 80 miles Source S.M.O., WAPDA	Consultants www.osmani.com OSMANI Engineering - Architecture - Planning - Mapping - Technology Osmani & Company (Pvt) Ltd. 245/2K/6, PECHS, Karachi - 75400, Pakistan Tel: (92-21) 4546541-2 Fax:(92-21)4534691

MAP -6.2: DEPTH TO GROUND WATER TABLE OF SINDH

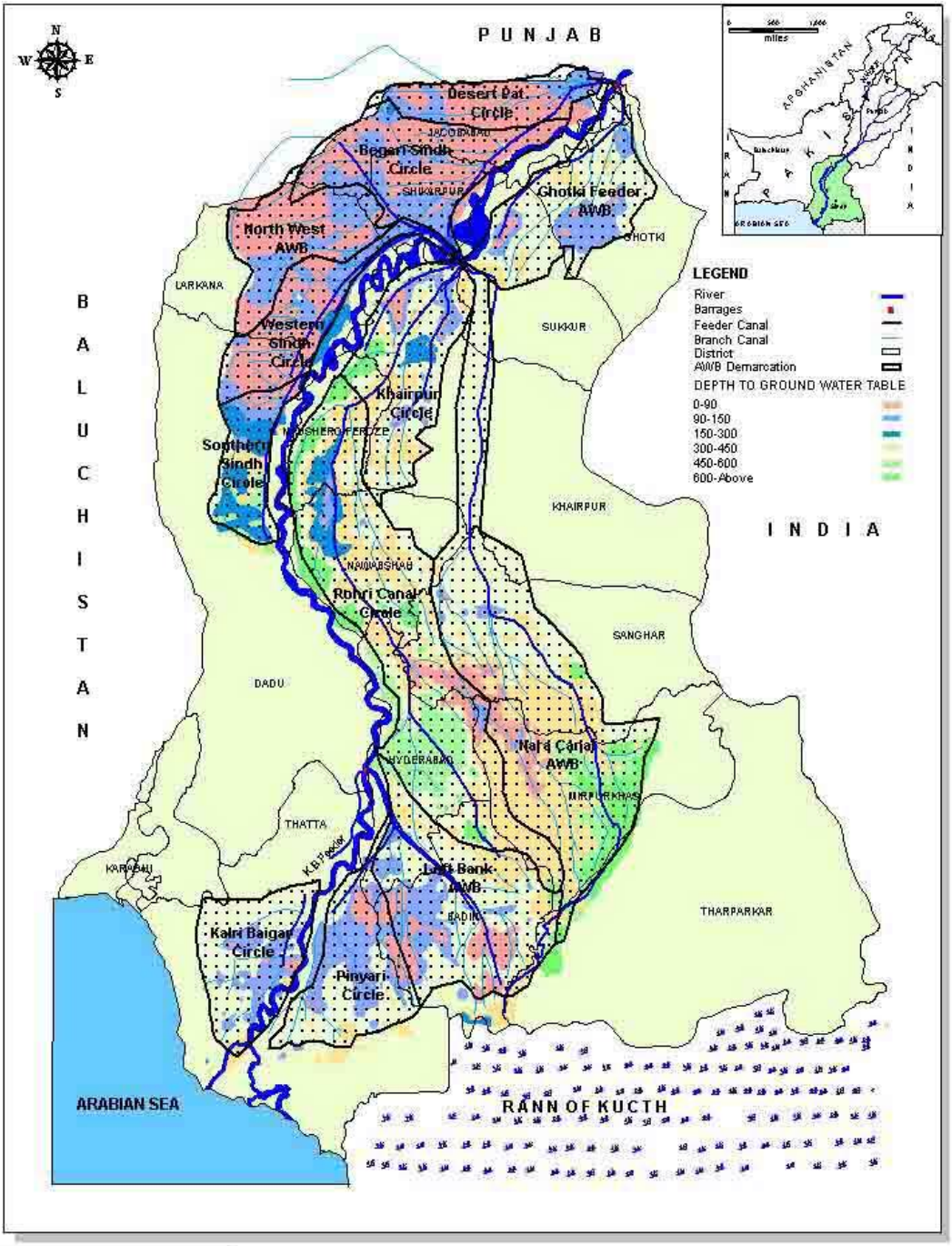


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Table 6.2
Extent of salinization on cultivated and non-cultivated land

S/N	Extent of salinization	Area [million acres]
Cultivated Lands		
1	Non-saline	9.060
2	Slightly saline	0.815
3	Saline sodic and gypsiferous	0.296
4	Saline sodic	0.247
	Sub-Total	**10.418**
Uncultivated Lands		
1	Saline with sparse vegetation	2.124
2	Saline barren	0.273
	Sub-Total	**2.397**
	Ttotal command area	**12.815**

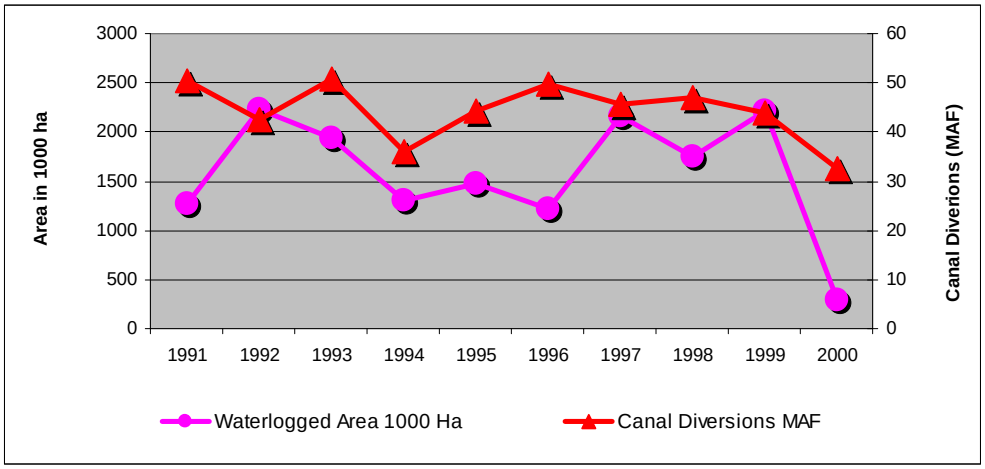
Source: I&P Department, Govt. of Sindh

Table 6.3
Extent of waterlogging in Sindh in the month of June

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Waterlogged area [1000 Ha]	1272	2226	1936	1300	1466	1220	2164	1743	2205	285
Canal diversions [MAF]	50.3	42.5	50.7	36.1	44.1	49.6	45.7	47	44	32.7

Source: World Bank working paper - Sindh Water Resources Development: Issues and options, August 2003.

Figure 6-1
Annual canal diversion and extent of waterlogging



ii) Reclamation: In order to reclaim waterlogged and saline areas, drainage projects were initiated. A large number of SCARP wells were drilled to provide vertical drainage, mostly in areas where groundwater is saline. However, fresh groundwater areas were also covered and well water was used for irrigation. Table 6.4 illustrates some of the details.

Table 6.4
Vertical drainage systems in saline and fresh groundwater

S/N	SCARP area	Year	No. of fresh water wells	No. of saline water wells	Total
1	Khairpur	1970-71	275	370	645
2	Noushero Feroze	1980-1981 1991-1992	575 1225	123	698 1225
3	LBOD	2003	-	330+189*	519
4	Sukkur	1991-1992 1984-1985	-	1090 532	1090 532
5	Sanghar	1991-1992	-	625+1*	625
6	Mirpurkhas Project	1991-1992	-	329+171*	500

Source: I&P Department, Govt. of Sindh
* Scavenger wells

A large number of surface drains are also in operation. Table 6.5 provides their details. Recently (2004-2005), about 14 sub-drainage projects were completed under National Drainage Programme, draining small areas into LBOD. The LBOD drains left bank of Indus into Sammando Creek in Arabian Sea. It covers Sanghar, Hyderabad, Nawabshah and Badin districts. Similarly, the RBOD after completion in 2006 would drain the right bank of river Indus, particularly Shikarpur, Larkana and Dadu districts, and eventually empties into Gharo Creek in the Arabian Sea. It runs parallel to river Indus on the right bank. The RBOD would also bring the effects of the "Pancho" water from rice cultivated areas of Larkana, Shikrpur and Dadu districts under control. Pancho water is the surface runoff from rice fields, and is a traditional irrigation practice which involves clossal wastage of irrigation water. The Main Nara Valley Drains (MNVD), which drains the northern districts on right bank and flows into Manchar Lake, will be connected to RBOD passing Manchar Lake. A detailed discussion of Tidal Link issues are presented under Inundation of Badin in this report as Appendix-A.

Table 6.5
Horizontal drainage systems in Sindh

S/N	Command Area Name	No. of Drains	Length [miles]	Drainage Area [million acres]
1	Sukkur Barrage	397	1761	2.43
2	Kotri Barrage	357	2050	1.79
	Total	**754**	**3811**	**4.22**

Source: I&P Department, Govt. of Sindh

c) **Soils**

Large quantitities of sediments is brought by Indus River and is deposited along the Indus River banks and especially in the deltaic zone. Further hill torrents also bring silt and clay deposits in the lower reaches. These silts provide a highly fertile layer of soil to the region. The soils along the Indus River banks are silty and sandy loam. Outside the active flood plain, the soils are generally calcareous, loamy and silty clay. Most of the soils in the district of Thar and parts of

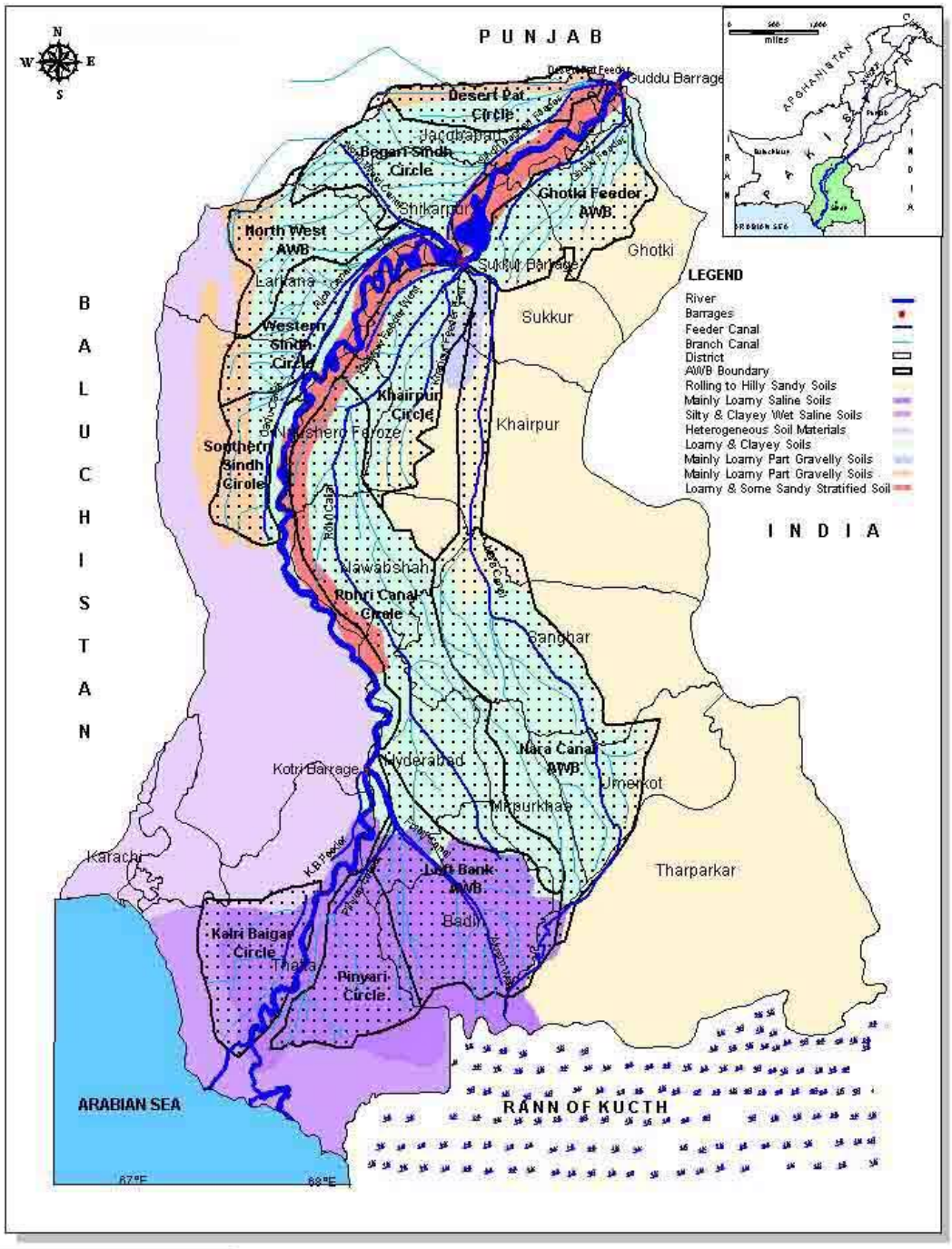
Khairpur and Sanghar districts are sandy. Moving sand dunes are also found in these districts. Map 6.3 shows soil patterns of Sindh.

6.1.2. Biological Environment

The variation in the climatic conditions between upper and lower Sindh is not reflected in the flora of the two zones. These regions have a diverse habitat, which supports a large variety of animal from riverine forest to the desert ecosystem of Tharparker, and from Khirthar mountains to the mangroves forest of Indus Delta. Common animal habitats are riverine plains, mountains, desert and deltaic region. These habitats support the peculiar species according to their requirements. The following broad categories have been identified for this report focusing on the project area:

a) Fauna: The fishing cat (felis viverina) found in Indus Delta, the desert cat (Felis sivestris ornate) found on the border of Nara Canal AWB, and the common jungle cat (Felis chausprateri) are becoming rare. The Hyaena (Hayaena striata) is sparsely found in project areas.

MAP-6.3: SOIL PATTERN OF SINDH



Client
Sindh Irrigation & Drainage Authority (SIDA)
Government of Sindh

Project
Integrated Social & Environment Assessment (ISEA) for Proposed Sindh-Water Sector Improvement Project.

Scale
0 40 80
miles

Source
N. D. P.

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The herbivores (Perisso dectyla) include deer, antelopes, grazelles, etc. Animals that have reached the state of endangered species due to excessive hunting include:

i) Hog deer (Axis porcinus porcinus) used to be found in the dense riverine forest throughout Sindh is very rare now.
ii) Black buck (Antelope cervicapra) is near extinction. Only few are found in Khairpur district.
iii) Chinkara (Gazella gazella bennettii) is found in Kirthar range. Previously, this animal used to be found everywhere in Sindh.
iv) Sindh Ibex (Capra hercus blythic) and wild sheep (Ovis orientalis blan fordi) are found in Kirthar Range and Dadu districts but their number is declining.
v) Asian wild ass (Equs hemionus) is found in Rannof Kutch. Wild boar (Sus scrofa cristatus) is common in riverine forests.

The common reptiles found in Indus are gharial (Gavialis gangeticus). The marsh crocodile (Crocodiles palustris) is almost extinct. In addition, fresh water turtles, marine green turtles, land tortoise, fresh water tortoise are also found in the area. Out of 43 species of snakes found in Sindh, 21 are non poisonous and 13 species are in marine category found in the Indus delta.

b) Flora: The project area lies on the border land of tropical and extra tropical regions with very little rainfall. The dominant flora of this arid zone consists of communities of deciduous and xerophytic trees and shrubs. Plants and trees with small leaves and thorny species are predominant. These include: Babul (Acacia nilotica), Nim (Azadirachta indica), Ber (Ziziphus vulgaris or jujube), Lai (Tamarix Orientalis), Kirrir (Capparis aphyla), and Kandi (Prosopis cineraria) in Ghotki and Nara AWB, and variouis species of mangroves (Aegiceras majus, Brugiera gymnorhiza, and Ceriops candolleana - Chauri/Kirari) and weeds in Indus Delta. Several type of water lilies are also found in waterlogged areas, surface drains, and on the periphery of lakes. In many places, the open water is dominated by submerged aquatic vegetation filling the whole water profile. The more common weeds and lilies include: Typha Angustala, Juncus articulatus, Scipus Littotalis, Phragetes Kark, and Nyasphaea Lutus (bottom rooted plants spreading on the water surface).

c) Protected Areas of Sindh: In 1997, there were 54 protected areas in Sindh. These include 14 game reserves, 1 national park (Kirthar), 35 wildlife sanctuaries, and 4 unclassified areas. Currently, these have been reduced to 32 as a result of declassification for the purpose of rationalizing the classification system by the Sindh Wildlife Department (Table.6.6). Sindh Wildlife Department (SWLD) is the management authority of protected wildlife sanctuaries (including protected wetlands), game reserves and national parks. Government of Sindh has promulgated legislation to protect these areas and their threatened species. The legislation is known as Sindh Wildlife Protection Ordinance 1972. Apart from these protected areas, a number of wetlands are present in Sindh province, 10 of which are declared wetlands of international importance (Ramsar Sites).

The protected areas declared by SWLD however contain pockets of lands where irrigation and cultivation is on-going since ages and even after the declaration of these areas as protected areas. There are proprietary issues as well as other legal issues pertaining to this aspect. Furthermore, the exact geographical boundaries of these protected areas are not very well defined on available maps, resulting in the approximation of these boundaries. With these limitations, an approximate location map of Protected Areas of Sindh with project area superimposed is presented in Map 6-4.

Wildlife Sanctuaries and Game Reserves**:** As per Sindh Wildlife Protection Ordinance 1972, the protected areas have been divided into the following three categories:

National Parks: Hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. There is only one national park (Kirthar National Park) in Sindh province, which is by itself outside the project area of WSIP.

Wildlife Sanctuaries: Wildlife Sanctuaries are areas which are left as undisturbed breeding grounds for wildlife. Cultivation, grazing and residing is prohibited in the demarcated areas. Special permission is required for entrance of general public. However, in exceptional circumstances, these restrictions are relaxable for scientific purposes or betterment of the respective area at the discretion of the authority. Certain wildlife sanctuaries however fall in or around the project area of WSIP, the list of which is presented in Table 6-7.

Game Reserves: Game reserves are designated as areas where hunting or shooting is not allowed except under special permits.

Three major protected areas - Takkar Wildlife Sanctuary (TWS), Nara Desert Wildlife Sanctuary (NDWS) and the Nara Game Reserve (NGR) - are in the vicinity and partially within the boundaries of the Nara and Ghotki AWBs as shown in the attached Map 6-4. These areas were notified as protected areas under the SWPO in 1968, 1962 and 1980, respectively. The NGR located in Khairpur district of Sindh and within the lift irrigation scheme area of Nara AWB is repository to a number of wildlife species, some of which are protected under SWPO and included in the IUCN Red List. A variety of wetlands and associated waterfowls are a key feature of the game reserve, as are the marsh crocodiles and hog deer. The game reserve occupies an area of approximately 105, 228 hectares and extends approximately 4 to 5 km on either side of the Nara canal from a Phariario village in the north to Jamrao head works in the south. The source of wetlands in this area is the seepage from the Nara Canal.

The TWS covers a total area of 43,513 hectares. A part of it lies in the lift irrigation scheme area of the Nara AWB and the Khairpur Irrigation Circle. Under the IUCN listing the wildlife sanctuary is given a category IV status. The wildlife sanctuary covers mainly the Rohri hills and the Nara desert. The NDWS lies on the east of the lift irrigation strip of Nara AWB and the northern part of it is within the boundary of Ghotki AWB.

Table 6-6
Wildlife sanctuaries and wetlands in and around WSIP area

S/N	Name	Area (Ha)	Date	Location	AWB	Classification	Remarks
1	Bijoro Chach	121	1977	Near Kalankot, Thatta		WLS	-
2	Cut Munarki Chach	405	1977	Near Ghorabari, Thatta		WLS	-
3	Drigh Lake	164	1972	Near Qambar, Larkana		*WLS-R	-
4	Dhoung Block	2,098	1972	Near Abad, Shikarpur/Jacobabad		WLS	-
5	Gullel Kohri	40	1977	Near Kotri Allahrakha, Thatta		WLS	-
6	Gulsher Dhand	24	1977	Near Barochobagh, Hyderabad	1	WLS	-
8	Hadero Lake	1,321	1977	Thatta		WLS	-
9	Haleji Lake	1,704	1977	Thatta		*WLS-R	-
10	Keti Bunder North	8,948	1977	Near Shahpur, Thatta		WLS	-
11	Keti Bunder South	23,046	1977	Thatta		WLS	-
12	Khadi	81	1977	Near Tando M. Khan, Hyderabad	1	WLS	-
13	Khat Dhoro	11	1977	Near Luqman, Khairpur	2	WLS	PA
14	Kinjhar (Kalri) Lake	18,468	1977	Thatta		*WLS-R	-
15	Kot Dinghano	30	1977	Near Sakrand, Nawabshah		WLS	-
16	Lakhi	101	1977	Near San, Dadu		WLS	-
17	Mahal Kohistan	70,577	1972	Near Goth Sumar, Dadu		WLS	-
18	Majiran	24	1977	Near Tando M Khan, Hyderabad	1	WLS	PA
19	Marho Kotri	162	1977	Thatta district		WLS	-
20	Miani Dhand	57	1977	Near Bhurgari, Hyderabad	1	WLS	-
21	Mohabat Doro	16	1977	Near Mohbat Dero Noushero feroze		WLS	-
22	Munarki	12	1977	Near Garho, Thatta		WLS	-
23	Nara Desert Wildlife Sanctuary (NDWS)	223,590	1980	District Khairpur	2	WLS	PA
24	Norange	243	1977	Near Pir Patho Thatta		WLS	-
25	Rann of Kutch	320,463	1980	South East , Tharparker		WLS	-
26	Sadnani	84	1977	Near Pir Patho Thatta		G.R	-
27	Samno Dhand	23	1977	Near Bhit Shah, Hyderabad	1	WLS	-
28	Shah Lando	61	1977	Near Hadero Dhand, Thatta		WLS	-
29	Takkar (TWS)	43,513	1968	Near Kot Deji, Khairpur	2	WLS	PA
30	Deh – Akro	20,500	1988	Near Deh – Akro, Nawabshah		WLS	-
31	Nara Game Reserve(NGR)	109,966	1980	Sohra, Khairpur	2	G.R	PA
32	Khirthar	308,733	1980	Dadu District		N.P	-
33	Nurri Dhand 4	4,100	2001	Badin District	12	*WLS-R	PA
34	Jabho Dhand	9,000	2001	Badin District	12	*WLS-R	PA

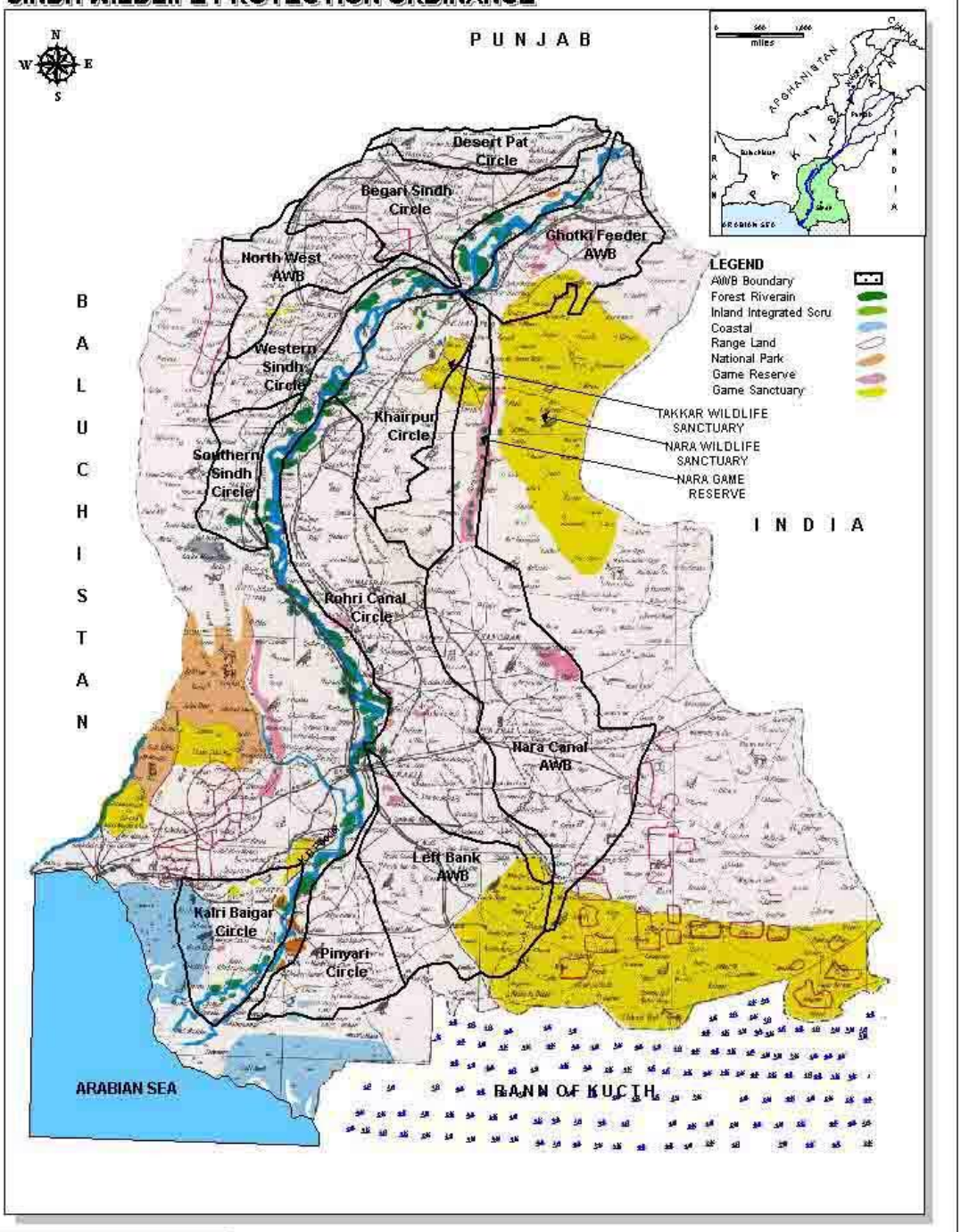
WLS: Wildlife Sanctuary
WLS-R: Wildlife Sanctuary – Ramsar Site
GR: Game Reserve
NP: National Park
Source (1) * A directory of Asian Wetlands
(2) ISEA

PA: Located in or around the Project Area
1: Left Bank (Area Water Board)
2: Nara (Area Water Board)
3: Ghotki (Area Water Board)

d) Wetland Resources: In Sindh, wetlands represent a large variety of inland and coastal habitats, which vary in origin, character and size. These wetlands host a great diversity of species and are of cultural and economic importance to local communities. Although wetlands in Sindh support some of the most significant biodiversity and are very important resource for millions of people, their degradation and destruction continues unabated. Manchar Lake is a classic example, which has been degraded due to drainage, developmental activities, disruption of water resources, pollutions, eutrophication, siltation, etc. Map 6.5 shows wetlands of Sindh. There are 10 declared *Ramsar* Sites in Sindh out of a total of 19 in the whole of Pakistan (Map 6.5).

Besides these important wetlands, Nara Canal comprising of upper Nara and lower Nara is also a source of water for more than 200 small lakes between Sorah and Sanghar in the Khairpur and Sanghar districts, and in the desert areas of Nawabshah and Umerkot districts. It is a system of small, permanent and seasonal, fresh, brackish and saline lakes and marshes stretching in a 150 km long and 30 km wide strip on either side of Nara. The following thirty seven small lakes

MAP -6.4: PROTECTED AREAS OF SINDH UNDER SINDH WILDLIFE PROTECTION ORDINANCE



Client Sindh Irrigation & Drainage Authority (SIDA) Government of Sindh Project Integrated Social & Environment Assessment (ISEA) for Proposed Sindh-Water Sector Improvement Project.	Scale 0 40 80 miles Source Wildlife of Sindh - Sindh Wildlife Management Board	Consultants www.osmani.com OSMANI Engineering - Architecture - Planning - Mapping - Technology Osmani & Company (Pvt) Ltd. 245/2K/6, PECHS,Karachi - 75400,Pakistan Tel: (92-21) 4546541-2 Fax:(92-21)4534691

(Table 6-7) are situated inside the Nara Game Reserve, for which the source of water is the seepage from the Nara Canal.

Table 6.7
Lakes in the Nara Game Reserve

S/N	Lake	S/N	Lake	S/N	Lake
1	Adlahu	14	Senhori	26	Sheenhlo
2	Akhairo	15	Sorah	27	Simnowahi-d Bahze
3	Akhanwari	16	Halari	28	Sodar pir
4	Duhanwari	17	Jamaloho	29	Wichowaro
5	Gayon	18	Jagir	30	Somem
6	Harni	19	Kharewaro	31	Putkan
7	Kathore	20	Paneri	32	Jari
8	Kharando	21	Pharyaro	33	Kheer
9	Khararo	22	Dongiwari	34	Berwari
10	Mohammad wari	23	Kinny	35	Torti
11	Nagi pir	24	Halari	36	Doodewari
12	Sadso	25	Shahaho	37	Sim
13	Samabi				

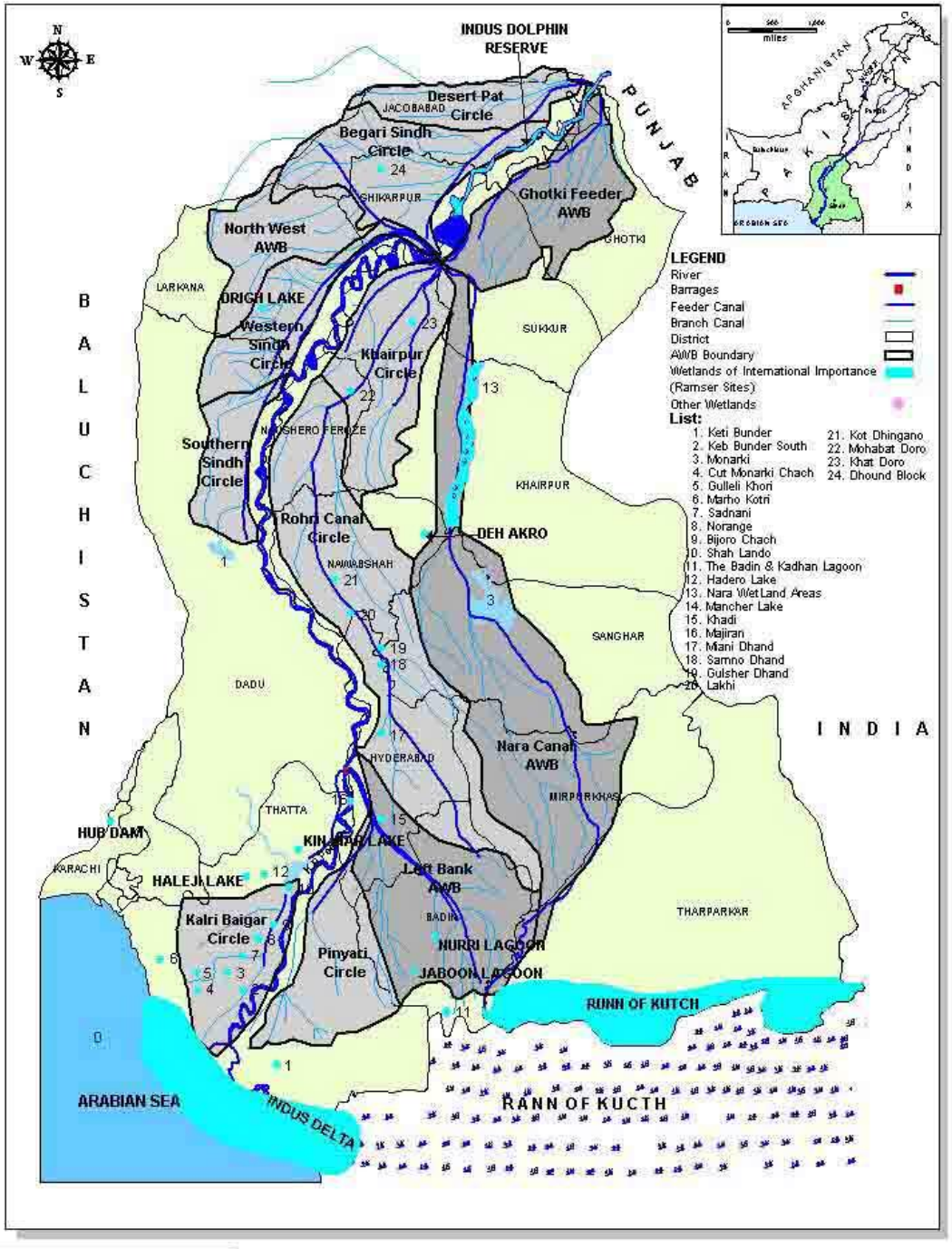
At present, it is not possible to assess the impact on the recharge of dhands and wetlands due to lining of the proposed ten distributaries. It would depend on the distance of the dhands or wetlands from the distributaries proposed to be lined. However, it is foreseen that the seepage from distributaries is insignificant as compared to unlined main canals, which are one of the sources for wetland recharge. Therefore, it is expected that lining of minors and distributaries will not have a significant negative impact. Nevertheless, detailed EA and EIA would be required during the detailed design of each intervention.

6.3. Environmental Impact Assessment, Enhancement and Mitigation Measures

Based on the nature of physical works and subsequent effects, the negative impacts on the physical and biological environment are very limited whereas the positive impact would be substantial. Major social and environmental impacts of poorly maintained irrigation system may be identified as:

- Waterlogging and Salinity: Increased recharge from the irrigation system would lead to a rise in water table. In saline groundwater zones, the rise in water table has a negative impact - salinity. About 40,000 hectares of land within Sindh is lost to a twin menace of waterlogging and salinity every year. The soil loses both the productivity and bearing capacity because of these curses.

MAP -6.5: WETLANDS OF SINDH



Client
Sindh Irrigation & Drainage Authority (SIDA)
Government of Sindh

Project
Integrated Social & Environment Assessment (ISEA) for Proposed Sindh-Water Sector Improvement Project.

Scale
0 40 80
miles

Source
Directory of Asian Wetlands

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- Water Pollution: The surface and groundwater become polluted because of inflow of untreated industrial and domestic effluents. Table 6.8 shows the water quality parameter of drinking water samples at Hyderabad and Sukkur provided by PCRWR, in which samples from urban water supply system were tested. Increased application of irrigation water on irrigated lands affected by salinity would also cause more salt laden return flow to the river, which would be a threat to water quality and health of aquatic habitat downstream.
- Inequitable Distribution of Water: The tail-enders recieve inequitable share of water. The influential landowners may use more water sidelining the poor and vulnerable farmers.
- Silting of Conveyance System: The silting of channels has a negative effect on distribution system.
- Decreased Crop Productivity: Low water efficiency will eventually lead to less water for irrigation, and hence low crop productivity.

On the other hand, the positive direct impacts of the physical works under the project include:

- Increased irrigation water supplies in general and equitable water distribution to the tail-enders in particular.
- Improvement in quality of drinking water where surface water is the source.
- Reduction in seepage and thus saving of precious canal water already in short supply. (Reduction will occur both due to lining and for unlined channels by improving the shape and surface conditions of canal prism).
- The institutional reforms and improvements proposed in the project would further enhance positive impacts in the environmental and social sector through better and efficient management of water.

Environmental impacts due to project intervention can be categorized into two phases: construction phase and post-construction phase impacts. The following sections provide different impacts, enhancements and mitigation mechanisms.

6.3.1. Construction Phase Impacts, Enhancements and Mitigation Measures

The rehabilitation and new construction works on various infrastructural schemes involve major earth work, desilting and concreting. Potential impacts and mitigation measures are discussed below:

i. Disposal of Excavated Earth and Canal Silt: The rehabilitation and improvement works of various irrigation infrastructures involve massive earth works. Proper disposal of excavated earth is imperative. Therefore, excavated earth would be used for making spoil banks. Proper cut and fill methodology would also be incorporated in the design. The silt removed would be disposed off properly and, where possible, utilized as fertilizer in the fields.

ii. Dust Pollution: Dust pollution is expected due to heavy traffic and un-metalled roads in the project area. This would cause serious negative impact (e.g., causing respiratory infection problems) on workers and population in the vicinity of construction area and those located on the approach roads. To mitigate the negative impact, all access roads would be sprinkled with water. Access roads which are likely to be used in future would be metalled.

iii. Noise Pollution: Operation of a large number of earth moving machineries, dump trucks, generators, pumps etc. would cause noise levels exceeding allowable limits of 80 to 90 dB. The impact will be medium and negative but of a temporary nature. This would need mitigation for site staff, labourers, camp

dwellers, pump operators, etc. There is no noise control standards laid down in NEQ for fieldwork/earth machinery in Pakistan. However, the following standards adopted in Canada can be used as a guideline to assess pollution in the field. The Canadian Labour Code Regulation for noise control (of January 1973) states that no employer should allow an employee to work in a place where noise reached 90 dB (A) or more. However, the same Regulation provides some flexibility with reason. The limit as such is virtually extended to 115 dB (A). This is evident from further statement that there should be reasonable grounds for not complying with the general provision; the task manager can authorize his employees to work in their daily jobs as shown in Table 6.9. The Code also states that exposure to impulsive noise should not exceed 140 dB (A), measured on rapid response scale. To mitigate the impact of noise, all concerned staff should be provided with the necessary ear protection gears and their use while on duty should be made mandatory. In addition, silencers should be used as much as possible on vehicles and machineries in use.

Table 6-8
Drinking water quality analysis

S/N	Water quality parameter	Unit	HDL	Sukkur			Hyderabad		
				Min.	Max.	Avg.	Min.	Max.	Avg.
1	Alkalinity	mmol/l	NGVS	1.20	11.20	3.38	1.50	5.80	1.96
2	Arsenic	ppb	10 (WHO)	0	0	0	0	200	13.8
3	Bicarbonate	mg/l	NGVS	60	560	168.75	75	290	98
4	Calcium	mg/l	75 (KSA)	22	76	34.33	25	88	33.93
5	Carbonate	mg/l	NGVS	0	0	0	0	0	0
6	Chloride	mg/l	250 (WHO)	3	216	50.25	5	124	25.33
7	Chromium	ppb	50 (WHO)	0	8	1.92	0	25	9.20
8	Conductivity	µS/cm	NGVS	170	1877	570	260	1150	387
9	Fluoride	mg/l	1.5 (WHO)	0	0.56	0.26	0.20	0.42	0.46
10	Hardness	mg/l	500 (WHO)	85	390	171.25	100	370	136.33
11	Iron	mg/l	0.3 (WHO)	0.20	1.20	0.57	0.02	3.90	1.33
12	Magnesium	mg/l	150 (Canad)	7	68	20.50	8	36	12.47
13	Nitrate (N)	m/l	10 (WHO)	1	5.60	4.16	0.50	4	2.14
14	pH	-	6.5-8.5	7.10	7.80	7.47	6.50	7.70	7.15
15	Phosphate	mg/l	NGVS	0.01	0.22	0.08	0	0.22	0.05
16	Potassium	mg/l	12 (EC)	4.10	10	5.36	4	10	5.94
17	Sodium	mg/l	200 (WHO)	9	306	89.75	10	102	26.20
18	Sulfate	mg/l	250 (WHO)	25	250	96.75	28	138	45.07
19	TDS	mg/l	1000 (WHO)	144	1314	468	161	782	244.93
20	Turbidity	NTU	5 (WHO)	0.50	154	54.59	2	160	40.80
21	Total Coliform	MPN/100 ml	Nil (WHO)	0	9	4.42	0	16	4.20

Source: Pakistan Council of Research in Water Resources (PCRWR)

HDL = Highest Desirable Level
NGVS = No Guideline Value Set
WHO = World Health Organization
KSA = Saudi Arabian Standards.
Canad = Canadian Standards
EC = European Community.

Labor Camps: Labor camps, servicing and refueling of vehicles would cause air, soil, and water pollution. The impact will be medium and negative but of a temporary nature. For mitigation, provision of septic tanks and treatment of wastewater would be made. Treated water would also be used for sprinkling on un-metalled access roads to control dust pollution.

Borrow Pits: Extraction of material from borrows pits may damage ecosystem balance of the area, upset the aquifer and leave an unscenic site. The impact will be small and negative but of a permanent nature. For mitigation, necessary measures in planning borrow pits would be adopted, which include restoration of the site after completion of works. A safe distance from the canal banks to be kept to ensure safety against short circuiting of seepage path.

Approach Roads: Construction of acces roads including movement of earth moving equipment and transport of materials would cause additional load on existing roads. Access roads to project sites may also damage the crop. Cultivated areas would be avoided for constructing access roads.

Table 6-9
Canadian labour code regulations against noise pollution

Noise level in dB (A)	Maximum exposure time (hours/day)	Noise level in dB (A)	Maximum exposure time (hours/day)
Between 87 and 90	8	Between 100 and 102	1½
Between 90 and 92	6	Between 102 and 105	1
Between 92 and 95	4	Between 105 and 110	½
Between 95 and 97	3	Between 110 and 115	¼
Between 97 and 100	2	More than 115	0

Destruction of Flora and Fauna

Flora

The destruction of some flora would take place during construction of approach roads, areas of labor camps, oil and vehicle storage areas. There is a possibility of tree removal due to the project activities. Mitigation measures include avoiding access roads through vegetation and compensate damages by extensively planting at least five trees in the immediate vicinity for every tree cut and bringing them to maturity.

Fauna

High noise level may disturb the fauna in wildlife sanctuaries located close to the work area. Working would be confined to day light hours. No night travel would be allowed. This will have limited and negligible impact on fauna. Extended canal closures for rehabilitation works may have short to medium term adverse impact on the aquatic and other terrestrial lives. Detailed EAs will identify and analyze such impacts and location of such impacts in detail and will propose adequate mitigation measures.

Reptile Communities

These communities will be affected during construction phase of embankment and canal lining. This impact will be temporary and not significant as this will only be within the canal system.

6.3.2. Post Construction Impact

The assessment of environmental impacts and their mitigation measures in post construction phase are given below.

6.3.2.1. Physical Environment

a) Water Resources

i) Water Quality: Lining of few distributaries and minors out of the whole network of unlined channels will partially improve the water quality. However the impact of discharging untreated municipal sewage and industrial effluent into the canal system would continue to contaminate the water. Quite a few towns and industrial units located along the main canals are discharging their wastewater into the canals. This will persist and remain unaffected by any of the project interventions unless checked by the concerned agencies.

The activity of clothes washing and cattle bathing along lined distributaries and minors is likely to continue unabated resulting in water pollution due to soap/detergents and damage by cattles. The design will take into account provision of washing bays, cattle baths and crossing.

ii) Irrigation Water Availability: With lining, seepage will reduce and water availability would increase, particularly for the tail-enders. This would be a positive impact. Further, as a result of better water management there will be a positive impact of increased water supply and consequently increased production

iii) Ground Water Quality and Levels: Seepages from canal system and from over-irrigation are two sources which raise ground water levels. With project intervention (rehabilitation and improvement of the irrigation conveyance and application system), there would be proper applications of water to the fields and proper water management and scheduling that would mitigate the rise of groundwater table. The groundwater quality would also improve through reduction of seepage and subsequent recharge of saline water from the upper soil layer to the lower aquifer.

iv) Increased use of Pesticides: There is a likelihood of increased use of pesticides due to increase in intensity of cropping as a result of increased water availability. A nationwide Pest Management Plan is under implementation at the federal level and its implementation in the Sindh Province is through the DG Agriculture Extensions. As part of ISEA for SOFWMP, a detailed province-wide PMP was prepared. Since the PMP under ISEA for SOFWMP has already been adopted by Government of Sindh, there is no need for any additional measures under WSIP.

b) Surface Runoff: The project intervention as such will not have any significant impact on surface runoff. However, there would be a better management of surface water through integrated water resources management due to tree plantations along the canal banks and drainage lines that would also improve soil water holding capacity and runoff retention.

c) Seepage and Wetland Recharge: One of the main sources of wetland recharge in Sindh is seepage from canals or distributaries. The other sources for wetland recharge are direct rainfall, surface runoff and supply from feeder canals like KB Feeder, Ranto Canal, Manchar Feeder, etc. The seepage from distributaries

and minors, if cut off due to lining, may create some impact on adjoining wetland recharge. However, no significant impact is foreseen since the wetlands are located far away from the proposed project area. This aspect will however be investigated in detail during the environmental assessment studies for each sub-project, and adequate mitigation measures will be proposed where required. The Environment Management Plans prepared for each subprojects would be reviewed by the monitoring and evaluation (M&E) consultants, and by the Bank according to the prior review requirements.

d) Land and Soil

i) Soil Salinity and Alkalinity: Soil Salinity/Alkalinity will tend to reduce as a result of WSIP and resulting project interventions and proper water management.

ii) Soil Erosions: Bank erosion, which normally occurs in unlined canals, will reduce with the rehabilitations of canals and project interventions under WSIP.

iii) Excavated Soil: Excavated soil from the bank of distributaries and minors and also desilting of deposited silt can cause a negative environmental impact of significant and permanent nature if not disosed off properly. The mitigation measures include:

- Use of silt in the agricultural fields by farmers as fertilizer,
- Construction of embankments along the sides of canals providing inspection paths, and
- Spreading of earth in an even manner outside the embankment to avoid ugly landscape of uneven heap of earth.

e) Borrow Pits for Construction Activities: Borrow pits for canal rehabilitation work shall be located far away from the canal and where good quality soil is available. For improvement of main canals, rehabilitation of distributaries and other construction activities, standard practice as followed by Irrigation Department Govt. of Sindh need to be adopted to ensure proper location, quality of borrowed earth and subsequent restoration of the site.

f) Temporary Diversion Channels: Diversion channels if built during improvement of distributaries/minors would have to be filled back properly and restore the site including re-plantation of trees and vegetation.

g) Land Productivity: With the rehabilitations and improvements of canals and resulting increased water availability, crop yield would also increase.

h) Climate: No significant impact is foreseen on the climate

6.3.2.2. Biological Environment

a) Fauna

i) Bird Communities/Habitats: The rehabilitation and improvement work of the irrigation system would likely lead to higher use of chemicals, such as pesticides, herbicides and fertilizers. This, if not maintained properly through the PMP, in turn might cause water pollution, which would have an adverse impact on birds that feed on water and aquatic food from such water sources. Given the mitigation plans in place to implement an exhaustive PMP & IMP and the level of such far-fetched threat, no

significant impact on bird communities due to any of the physical intervention is foreseen.

ii). Mammal Communities: Main canal and distributaries rehabilitation and improvement works will have no impact on mammal communities, because during construction phase they will not be closed and continue to flow through temporary bypass. Similarly, in the post-construction phase no impact is foreseen on mammal communities.

iii). Reptile Communities: No impact on reptile communities is expected once the construction phase is over.

iv). Fish Communities: The improvement in main canals, distributaries and minors consisting of strengthening the banks and related works as such will not affect fish communities. However, the likelihood of increased use of pesticides and fertilizers due to agricultural intensification would have an adverse impact on water quality in the system, and hence aquatic habitat. A mitigation plan should include proper implementation of the PMP and others to maintain safe water quality standards for aquatic lives, including fish.

b) Flora

Some trees may need to be cut for physical works on main and branch canals, distributaries, and minors. The frequency of this possibility on-site is remote since existing alignment will be followed. However, there is likelihood of trees being removed for approach roads required for construction activities. The mitigation efforts should be made to adopt approach road alignment through least vegetative areas. However, wherever unavoidable, it should be made mandatory to plant five times larger the number of trees cut and restoration of vegetation by concerned contractors after the work is completed. Also, traditional practice of tree plantation along the main and branch canal banks shall be enforced by SIDA through its environmental cell.

c) Natural Habitat and Protected Areas

Depending on the location of natural habitat/protected areas vis-à-vis project intervention, necessary precautions have to be taken to protect them. However, at present it appears that the natural habitat/protected areas do not come within the project area since the work is being proposed on the existing channels and no new work/alignment is foreseen in the proposed investment plan. Therefore, OP 4.04 (World Bank Operational Policy on Natural Habitat) will not be triggered.

6.3.2.3. Summary

A summary of positive and negative environmental impacts is given in Tables 6.10a and b. It may be noted that most of the positive impacts are major, large and significant while those with negative impacts are minor, small, less significant, and mitigable. By initiating Integrated Water Resources Management (IWRM), the WSIP can make a positive contribution to environmental management.

Table 6-10a
Summary of environmental impacts assessment during construction phase

S/N	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
DURING CONSTRUCTION PHASE							
IRRIGATION & DRAINAGE INFRASTRUCTURE IMPROVEMENT							
a) Remodeling of Main & branch Canals							
1	Traffic Dislocation	–	–	–	–	X	–
2	Damage to Crop	–	–	–	–	X	–
3	Disposal of Excavated Earth	–	–	–	X	–	–
4	Dust Pollution	–	–	–	–	X	–
5	Noise Pollution	–	–	–	–	X	–
6	Labour Camp Pollution	–	–	–	–	–	X
7	Destruction of Fauna and Flora	–	–	–	–	–	X
8	Destruction of Fish	X	–	–	–	–	–
9	Employment	X	–	–	–	–	–
b) Improvement of Distributaries and Minors in Nara Canal, Ghotki and Left Bank AWBs. Construction of sumps on DOs and lift schemes on the side of canals or construction of new distributaries and minors parallel to main and branch canals							
1	Traffic Dislocation	–	–	–	–	X	–
2	Damage to Crop	–	–	–	–	–	X
3	Disposal of Excavated Earth	–	–	–	–	–	X
4	Dust Pollution	–	–	–	–	–	X
5	Noise Pollution	–	–	–	–	–	X
6	Labour Camp Pollution	–	–	–	–	–	X
7	Fauna and Flora	–	–	–	–	–	X
8	Employment	X	–	–	–	–	–
c) Lining of Distributaries and Minors							
1	Traffic Dislocation	–	–	–	–	X	–
2	Damage to Corp	–	–	–	X	–	–
3	Disposal of Excavated Earth	–	–	–	X	–	–
4	Dust Pollution	–	–	–	–	X	–
5	Noise Pollution	–	–	–	–	X	–
6	Labour Camp Pollution	–	–	–	–	–	X
7	Fauna and Flora	–	–	–	–	X	–
8	Diversion Channels	–	–	–	–	–	X
9	Employment	X	–	–	–	–	–

D: Definite large, frequent and serious impact
M: Likely medium and more frequent impact
S: Possible small and infrequent impact

Table 6-10b
Summary of environmental impacts assessment after construction phase

S/N	Environmental Issue	Positive Impact			Negative Impact		
		D	M	S	D	M	S
DURING POST CONSTRUCTION PHASE							
IRRIGATION & DRAINAGE INFRASTRUCTURE IMPROVEMENT							
a) Remodeling of Main Canals and Branch Canals							
1	Increase in Water Supply	X	–	–	–	–	–
2	Water Supply to Tail Enders	X	–	–	–	–	–
3	Improvement Water Quality Drinking & Irrigation	–	X	–	–	–	
4	Sedimentation	–	X	–	–	–	–
5	Improvement of Groundwater Quality	–	–	–	–	–	–
6	Reclamation of Salt affected soils	–	X	–	–	–	–
7	Water Logging	–	X	–	–	–	–
8	Flora	–	X	–	–	–	–
9	Fauna	–	X	–	–	–	–
10	Increase in Agriculture Production	X	–	–	–	–	–
11	Increase in Livestock Production	–	X	–	–	–	–
12	Increase in Employment	–	X	–	–	–	–
13	Increase in Land Value	X	–	–	–	–	–
b) Improvement of Distributaries and Minors in Nara Canal, Ghotki and Left Bank AWBs. Construction of sumps on Dos and lift schemes on the side of canals or construction of new distributaries and minors parallel to main and branch canal							
1	Increase in Water Supply	X	–	–	–	–	–
2	Improvement of Groundwater Quality	–	–	X	–	–	–
3	Sediments	–	X	–	–	–	–
4	Water Logging	–	–	X	–	–	–
5	Flora and fauna	–	–	X	–	–	–
6	Increase in Cultivation Area	X	–	–	–	–	–
7	Increase in Land Value	X	–	–	–	–	–
8	Increase in Livestock	–	X	–	–	–	–
9	Cattle Bathing	–	–	–	–	X	–
10	Washing of Cloths	–	–	–	–	X	–
11	Additional use of Pesticides	–	–	–	X	–	–
12	Water Quality for Drinking	–	X	–	–	–	–
c) Lining of Distributaries and Minors							
1	Increase in Water Supply	X	–	–	–	–	–
2	Water Supply to Tail Enders	X	–	–	–	–	–
3	Improvement of Water Quality for Drinking	–	X		–	–	–
4	Sedimentation	–	–	X	–	–	–
5	Improvement of Groundwater Quality	–	–	–	–	–	–
6	Reclamation of Salt affected soils	–	–	X	–	–	–
7	Water Logging	–	–	X	–	–	–
8	Flora and fauna	–	–	–	–	–	X
9	Increase in Agriculture Production	X	–	–	–	–	–
10	Increase in Livestock Production	–	X	–	–	–	–
11	Increase in Employment	–	X	–	–	–	–
12	Increase in Land Value	X	–	–	–	–	–
13	Other Benefits	X	–	–	–	–	–
14	Wetland Recharge	–	–	–	–	–	X

D: Definite large, frequent and serious impact
M: Likely medium and more frequent impact
S: Possible small and infrequent impact

6.4. Social and Environmental Management Framewok

The ISEA would establish a framework to provide a sustainable basis for the safeguards and the mitigation policies in order to avoid adverse environmental and social impacts that may arise due to project interventions. The types of plan that ISEA prepares includes, but not necessarily limited to, an Environmental Management Plan.

6.4.1. The Environmenyal Management Plan (EMP)

Detailed design of sub-project works would be prepared during the project implementation period. Therefore, the approach is to prepare sub-project specific EA/EMP for each contract in the framework of overall ISEA that would be implemented under the project. Depending upon nature, scale and complexity of works, sub-project/contract specific EA would assess general as well as site specific environment issues and preparation of sub-project specific EMP. Implementation of EMP would be included in the contract and addressed under the Project. Separate EA and EMPs would be prepared for the three major construction contracts related to rehabilitation of main and branch canals - Ghotki, Nara and Fulleli - as part of the detailed design report identifying overall and site specific environmental issues along with the management plans. In case of rehabilitation of distributaries and minors, the detailed design reports would be prepared for a group of five distributaries that are adjacent or as close as possible to one another. The design reports would also include EA and EMP in addition to the technical designs and form the basis of bidding documents. The contract specific EA/EMP would be reviewed and cleared by the M&E consultants (reporting to PCMU) who are also responsible for monitoring and supervision of the environment and social management plans in addition to project impact assessment. All design reports and EA/EMP related to the large canal rehabilitation contracts, and first five lots of design reports in each AWB for distributary/minors would be reviewed by IDA.

The environmental management framework in Table 6.11 presents a broad list of adverse environmental impacts likely to occur under proposed WSIP works with generalized mitigation measures and also assigning the responsibility to manage them. However, detailed environmental assessment for each sub-project will narrow down the potential adverse environmental impacts and will present an EMP which will become part of the sub-project bidding document.

Table 6-11
Environmental management pramework

S/N	Source of Impact	Potential Impact	Mitigation Measure	Responsibility		
				Implementation	Supervision	Monitoring
1	Rehabilitation of Main & Branch Canals	i) Improperly excavated earth/silt ii) Unattended borrow pits causing ponds a breading ground for mosquitoes, safety hazard, and deterioration of landscapes iii) Tree cutting iv) Dust, construction waste, noise, and other pollution due to traffic, oil spills, etc. v) Changes in surface/groundwater quantity & quality vi) Impact on land productivity vii) Impact on wetlands, protected areas viii) Impact on aquatic & terrestrial life	i) Proper disposal of excavated earth will be carried out as integral part of the rehabilitation works ii) Mandatory restoration and leveling of borrow pits. iii) The bidding documents would include proper management of the silt, excavated areas, and borrow pits, etc., removal of waste, standards for control of dust, noise, oil spills, management of the construction traffic etc. iv) The Bidding documents would also include plantation of trees along the channels which would be improved under the project. These costs are included in the project v) Impact on land productivity, wet lands, protected areas, aquatic life, flora and fauna would be assessed in detail for each sub-project and construction site and included in the construction and implementation plans.	Project Implementation consultants (PICs) screening and preparing EMPs for each subproject, and incorporating those in the bidding documents, construction plans, project plans along with monitoring require general of specific if any. SIDA EMU would work with the PICs in incorporating and ensuring Environment work is incorporated in the subproject designs and implemented in accordance with agreed and professional, national and international standards	PCMU's environmental unit with support from the Monitoring and Evaluation (M&E) consultants.	M&E Consultants, PCMU Sindh EPA where applicable and perhaps National EPA where applicable Bank supervision missions, with involvement of environmental specialist as and when required. PSC and Sindh P&D Department

				Responsibility		
2	Rehabilitation of distributaries & minors	i) Improperly excavated earth/silt ii) Unattended borrow pits causing ponds a breading ground for mosquitoes, safety hazard, and deterioration of landscapes. iii) Impact on wetlands iv) Tree cutting v) Several of the impact in this case would be similar to the main and branch canals and would be handled in similar ways.	These impacts would be handled in similar manner to the above for improvement of mina and branch canals. Silt would be more in case of distriburtaries and minors. However, silt from these channels has very high fertilizer value and a system would be evolved by FOs to distribute the silt to their participating farmers and also perhaps generate some funds for O&M of the channels.	Same as above with more involvement of FOs as they would be the implementing agencies and contractors in many cases.	Same as above with more involvement of AWBs	Same as above with more role of AWBs PSC and Sindh P&D Department
3	Washing of clothes in the distributaries and minors. Buffaloe crossings etc.	Contamination of irrigation and drinking water quality by detergents and soaps.	Washing bays be located and designed in consultation with the FOs and local community, particularly for distributaries and minors to minimize canal water contamination. Proper buffalo wallos and crossing identified jointly with the FOs would be constructed.	FOs, PICs, AWB	FOs assisted by their Assistant Engineer, AWB PCMU, M&E consultants	SIDA Environmental Unit M&E Consultants, PCMU

4	Supply of appropriate O&M equipment to FOs	No impact	Not required	FO/AWB	FOs assisted by their Assistant Engineer	M&E Consultants, PCMU
5	Increased agricultural activity	Possible increase in use of chemicals and pesticides.	A Pest Management Plan (PMP) is under implementation under the Sindh OFWM Project and national Integrated Pest Management (IPM) project covering whole Sindh. The implementation of PMP is being supervised under Sindh OFWM upon completion of which a study would be carried out in mid 2008 and continuation of any incomplete activities under PMP would be funded under WSIP particularly further training of farmers in IPM.	SIDA/AWB/FOs	M&E Consultants/PCMU	M&E Consultants, PCMU PSC and Sindh P&D Department
6	Preparation of regional plan for left bank of Indus, feasibility studies for rehabilitation of barrages	Full EA and SA are to be prepared as part of the studies, which would be carried out through extensive participation of major stakeholders and NGOs.	Environmental and social management plans to be prepared as part of the preparatory studies	SIDA, consultants for preparation of studies	SIDA, PCMU	PCMU, M&E Consultants Sindh P&D Department., PSC Bank Supervision missions.

7. INDIGENOUS PEOPLE

7.1 General Profile

Pakistan does not have any separate policy to define indigenous peoples or to protect their rights and cultural identities. However, the World Bank's Policy OP 4.10 on 'Indigenous Peoples' defines indigenous peoples, in a generic sense of the term, to a distinct, vulnerable, social and cultural groups possessing the following characteristics:

- Self-identification as member of a distinct indigenous cultural group and recognition of this identity by others;
- Collective attachment to geographically distinct habitat or ancestral territories in the project area and to the natural resources in these habitats and territories;
- Customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- An indigenous language, often different from the official language of the country of region.

In Sindh two groups of people may be considered as indigenous or in the context of Pakistan, ethnic minorities for purposes of applicability of World Bank's OP 4.10. These are the *Mohanas* (boat people) of *Manchar* Lake and the original *Thari* people who have a distinctive culture and lifestyle, conditioned to living in almost perpetual drought. A majority, though not all, of these people are Hindus belonging to what are termed as the 'scheduled castes'.

The total Scheduled Cast population in Sindh was around 300,000 as per the 1998 Census. Out of these, 93% were amongst the rural population of Sindh and out of this rural population, 87% were residing in the Tharparkar District. The Hindu Schedule Cast tribes in Sindh that may be termed as 'ethnic minorities' are mainly *Bheels*, *Kolhi's*, *Oads* and *Meghwar*. Some Muslim tribes of Tharparkar can also be considered as ethnic minorities, given that their culture and lifestyle is very similar to the Hindu tribes. The *Bheels* are mostly nomads, while the *Kolhi's* and *Meghwar* (who migrate seasonally) are engaged largely in non-farming work e.g. road construction and house building. Large numbers of women also work on construction sites. Women of these tribes are well known for their hard work and put in long hours of physical labour whether in Thar or outside.

While the *Mohanas* of *Manchar* Lake do not come within the project area of WSIP-Phase-I, some groups of scheduled castes, mainly *Tharis* and *Bheels*, are known to migrate seasonally to work as *haris* and temporary wage labourers in barrage-irrigated agricultural areas bordering Thar (Mirpurkhas, Badin and Sanghar districts). However, none of these ethnic groups appear to have any collective interest in any ancestral land within the project area.

7.2 Outcome of Consultative Meetings

A number of consultative meetings and Focus Group Discussions were organized at Ghotki, Badin and Mirpurkhas during the preparation of ISEA that were participated by NGO's, civil society and farmers representing the Area Water Boards of Ghotki, Left Bank, and Nara. Since representatives of these ethnic groups were not able to participate in any of the above meetings and focus group discussions, additional focus group discussions were specially organized (during October 2006) with several men and women from these communities in Mirpurkhas to investigate any specific social issues

and concerns that these groups may have in regard to their relationship to water management, their poverty and social levels. Local NGos and CBOs also participated in these FGD. Findings of these discussions include:

- ③ The participants were largely concerned about, water shortages, inequitable distribution and drainage. They were keen to learn about institutional changes under the water sector reform though with apparent apprehensions about its success.
- ③ These community members (both Hindus and Muslims) normally work on farms as *haris* or wage labourers. As *haris* they have the same sharecropping terms as other sharecroppers, and do not seem to be discriminated against for being different ethnic groups or Hindus per se. They face the same problems and have the same kind of relationship with the landlord as other sharecroppers from mainstream population. Some *hari* families have lived and worked in the same area (and sometimes for the same landlord) for several years, while others are more recent arrivals. In many cases they move regularly between their home in Thar and their current place of residence and work in the irrigated areas.
- ③ As wage labourers they get paid similar daily rates as other daily wageworkers. These group of workers stay on the farmlands for periods between a few months and a few years, most (though not all) travelling back and forth to their homes in Thar.
- ③ All these group of *haris* and labourers run the risk of being evicted by the landlords and do not have any permanent place or sustainable source of livelihood.
- ③ In their opinion, the WSIP interventions are likely to augment the possibilities of greater benefits of increased wage labour during construction period and subsequently in farming. These benefits would directly accrue to the all those who work as wage labour or *haris.* With greater representation of *haris* and waged labourors at WCA and FO levels, the benefits to these groups can be further increased.

7.3 Conclusion

As *haris* and daily wage labourers, the ethnic groups such as *Bheels* and *Tharis* share the same issues, problems and terms of engagement as other mainstream groups. The benefits and impacts of the proiject would be felt uniformly be these ethnic groups and those from mainstream population. None of these ethnic groups are likely to be affected adversely due to their ethnicity. Nor are they the main and direct beneficiaries of the proposed project. In as far as they are *haris* and wage labourers, they will be part of the inclusion plans for sharecroppers, wage earners and women. None of the planned project interventions will adversely affect them and the project will have no specific negative impact on them for being *Bheel* and *Tharis*..

In terms of the benefits as *haris* these ethnic communities will benefit directly due to increase in agricultural production and as wage labourers they are likely to benefit indirectly as increased farm activities like sowing of crops (sugarcane, vegetables), harvesting (wheat, rice), picking (cotton, chillies) and cutting of sugarcane, will mean increased employment opportunities.

None of the ethnic community members, *Bheels* and *Tharis*, have any collective attachment to any ancestral land within the project area and they do not have any political, cultural or political institutions distinct to those of mainstream population. These *haris* from *Bheel* and *Tharis* speak the mainstream Sindhi language and are fully integrated with the mainstream population, culturally and economically. However, these groups do maintain their ethnic identity and speak their own language as well. Since, none of these

ethnic groups cumulatively satisfy IP criteria specified in the World Bank's policy, the OP 4.10 will not be applicable.

8. SOCIAL IMPACTS, BENEFITS, CONSTRAINTS, MITIGATION MEASURES AND PUBLIC CONSULTATIONS

This part of the report focuses on the economic and social aspects of the water sector as they relate to the area within the jurisdiction of WSIP (Water Sector Improvement Project) being established in these Area Water Boards (AWB) of Sindh Province. The AWB's include Nara, Left Bank and Ghotki Feeder. In order to establish similarities/dissimilarities with non-project area (i.e. control group) the Right Bank Area was also covered.

The data/information at the level of farmers/water users was collected through two field instruments i.e. household survey and public consultations conducted under this ISEA. In subsequent sections, details are being provided along with analysis in the following sections. The outcome of the frequent public consultations over the proposed developmental activities under WSIP (Phase-I) has been presented in greater details in Appendix C of this report. Here the salient features of such discussions are presented.

The participant, though welcoming the proposed work, were largely of the opinion that unless detailed design of WSIP (Phase-I) are known it is difficult to ascertain whether issues of re-settlement, environmental degradation (or improvement) would be of significant nature. However, they agreed in principle that such issues may arise and need to be focused sharply.

With regard to the water sector reforms, SIDA and farmers representation at different tiers of the system, the participants showed their apprehensions that the measures under the reform may not succeed unless the whole process of change is monitored and supervised through independent sources. They agreed to bring in additional changes to ensure participation of small farmers and tail enders and called for transparent methods to be adopted. They hailed the idea of a local (F.M. Band) radio network for proper dissemination and adherence to the rules to achieve a sustainable development and ensure users participation.

8.1 SOCIO-ECONOMIC ASPECTS

Under this sub-section, a precise selection of key socio-economic aspects as they relate to future sustainability of the project was made. It primarily focused on the following:

- farm level water availability
- cropping intensity achieved
- income levels (including non-farm sources)
- poverty profiles

8.1.1 Farm Level Water Availability

In an arid to semi-arid region like Sindh, the status of canal water supplies are central since the rainfall pattern is highly unstable and the groundwater is largely brackish. The farmers were asked about the duration of water allowance sanctioned to them given size of land owned and allowance given for orchard cultivation (if any). The per acre time allowance for water allocation were computed given the area owned. The variability observed in per acre availability of water (measured in hour) was compared across various categories of farm size, tenurial arrangements, the region covered and locational differences.

The locational variations were measured in terms of location of farm within the watercourse and the location of watercourse on the channel. The locational attributes assigned were in terms of head, middle and tail. This particular detail was considered important due to the generally

prevalent view that the tail enders are always in a disadvantageous position and hence receive relatively less water on a per unit basis as compared to those at the head.

This locational analysis was considered extremely relevant in the context of variations in farm size ownership and tenure. The data analysis shows the variability across different strata. The information is based on 85 farms out of the total 121 sampled. The reduction is caused because the rest had either no own land (i.e. tenants) and/or some land owners had sharecropped out/rented out their land.

The highest variability is observed across farm size categories i.e. from 0.46 hours per acre of large farms to 1.01 hours for subsistence farms. This on the face seems contrary to the held views that large land owners exercise a larger (undue) share in the water supplies. The alternate explanation to such variability is that under the generally prevalent system of sharecropping in Sindh, the larger farms sharecrop-out land to tenants in small pockets of 6 acres to 15 acres, and the available water is intensively used within each pocket leaving behind a larger part of owned land uncultivated. The variations across tenurial groups tend to substantiate this explanation where the tenanted land receives 35 percent higher water sanctions as compared to owner cultivated pond.

The variabilities across the four regions shows wide variation particularly in relation to the control group i.e. Right Bank area which is predominantly a rice growing area but has tended to receive water supplies in both seasons.

It is, however, interesting to observe that, on average, the tail enders appear to receive larger supplies in relation to those at heads. The most plausible explanation seems that access to water supplies are not so strongly related to location per se. Rather it is the degree of economic and political power of land owners that gives them a better access to water supplies as well as other inputs in terms of their timing, amount and regularity. However, this must be reminded that there may be other control over water which the respondent did not reveal. For example, access through direct outlet (D.O.'s), unauthorized use of lift pump or undue sanction of orchard allowance etc. Though it was not possible under this study to conduct specific case study to further explore into such practices, it remains part of the common knowledge that such illegal and/or improper practices are quite common in Sindh. Under such circumstances it becomes increasingly difficult to overemphasize that large and influential landlords (regardless of their location in the command area) carry power and influence to create such inequities and sustain.

In view of above, it was considered important to look into the variations in cropping intensities in order to scientifically verify that larger farms are in advantageous position regardless of the location of their farms.

8.1.2 Levels of Cropping Intensities

The level of cropping intensity shows the extent to which the land available for cultivation is cropped. In a perennial area with two cropping seasons (e.g. left bank of Indus) the level of maximum intensity may reach 200 percent mark. However, in order to achieve such levels adequate control over water supplies is required, in addition to access to other inputs(table B-17 to B20).

The analysis shows levels of cropping intensities across same strata used for water availability in the preceding section. It shows a fairly high level of 163 percent (with a lowest of 100 percent). However, a close comparison of cropping intensities with water availability per acre shows

strong relationship[6]. Here again, the locational variations were not strongly associated with variations in cropping intensities exception in case location of watercourse on the channel where these located at head of the channel attained 170 percent as compared to tail watercourse at 160 percent.

8.1.3 Income Levels

The income levels of sampled households were estimated keeping view farm and non-farm sources of income. As such two levels of incomes were computed i.e. one based on all sources and the other based on farm income only. Tables 8.1 and 8.2 show such income levels.

In order to observe the sensitive issue of rural income poverty in Sindh, each estimate of income was classified into farms below and above poverty line which has been established by Government of Pakistan as Rs.9,120 per person (in adult units) per annum. As obvious, the non-farm sources augment the per capita farm income by 24 percent and 4 percent, respectively, for those below and above poverty line. This implies that those under poverty line are more mobile and search for other sources of incomes in significant proportions.

The total income of those above poverty line was 5.4 times higher, whereas in terms of farm income alone this proportion was 6.4. These disparities amply demonstrate groups of farms vulnerable to poverty trap.

Across farm size categories, the ratio of total income of large farms above poverty to those below poverty were over 22. Only 1 out of 13 large farm was below poverty. Among owner cultivators at this ratio was 5.4 and in case of tenants it was 2.7. Similar ratios when computed on the basis of farm income only revealed a ratio of 6.8 for owner and 2.58 per tenants.

Such income disparities were also obvious across regions. For example, it shows disparity ratios of 6.6 for NARA, 4.2 for Left Bank, 6.9 for Right Bank and 3.8 for Ghotki area, between those below and above poverty line.

TABLE – 8.1
PER CAPITA TOTAL ANNUAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE* BY FARM SIZE BY TENANCY

(Rupees)

FARM SIZE	TENANCY						TOTAL	
	Owner		Owner-cum-Tenant		Tenant			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	5,411 (4)	13,917 (5)	–	–	4,935 (14)	9,393 (1)	5,041 (18)	13,163 (6)
Small (5–16 acres)	6,279 (16)	23,981 (27)	4,274 (1)	11,741 (1)	5,284 (3)	13,922 (7)	6,029 (20)	21,619 (35)
Medium (16–50 acres)	6,315 (3)	30,229 (25)	–	18,786 (1)	–	–	6,315 (3)	29,789 (26)
Large (Above 50 acres)	2,818 (1)	71,554 (10)	–	21,663 (2)	–	–	2,818 (1)	63,239 (12)
Total	**5,994 (24)**	**32,662 (67)**	**4,274 (1)**	**18,463 (4)**	**4,997 (17)**	**13,356 (8)**	**5,549 (42)**	**29,988 (79)**

* Poverty line of Rs.9,120 per capita (Based on adult units) per year as established by the Planning Commission of Pakistan. Source: ISEA Survey Data, 2004.

[6] A farm budgeting approach using a larger sample which could have facilitated multivariate analysis could have been more relevant. However, under the scope of this study it was not possible.

The variations in incomes across those at head and tail of either within a watercourse or within a channel was not ostensible different which further strengthen the earlier held view that location per se does not indicate a source of deprivation as compared to variations in land holdings, tenure, and regions reflecting different agro-climatic and soil conditions, ethnicity, etc.

Table B.29 reflects the incidence of non-farm incomes in reducing the extent of income poverty.

The above comparisons amply demonstrate the fact that poverty is more pronounced within the scenario of farm income and that it significantly reduces (though still remains at alarming levels) with the advent of non-farm income opportunities. It also shows that variations in income are more related with farm size variations, tenurial arrangements and regional specificity and not locational factors.

For greater details and classification of information on poverty see Appendix – B.

TABLE – 8.2
INCIDENCE OF NON-FARM INCOME ON THE EXTENT OF POVERTY AND AVERAGE INCOME LEVELS ACROSS DIFFERENT STRATA

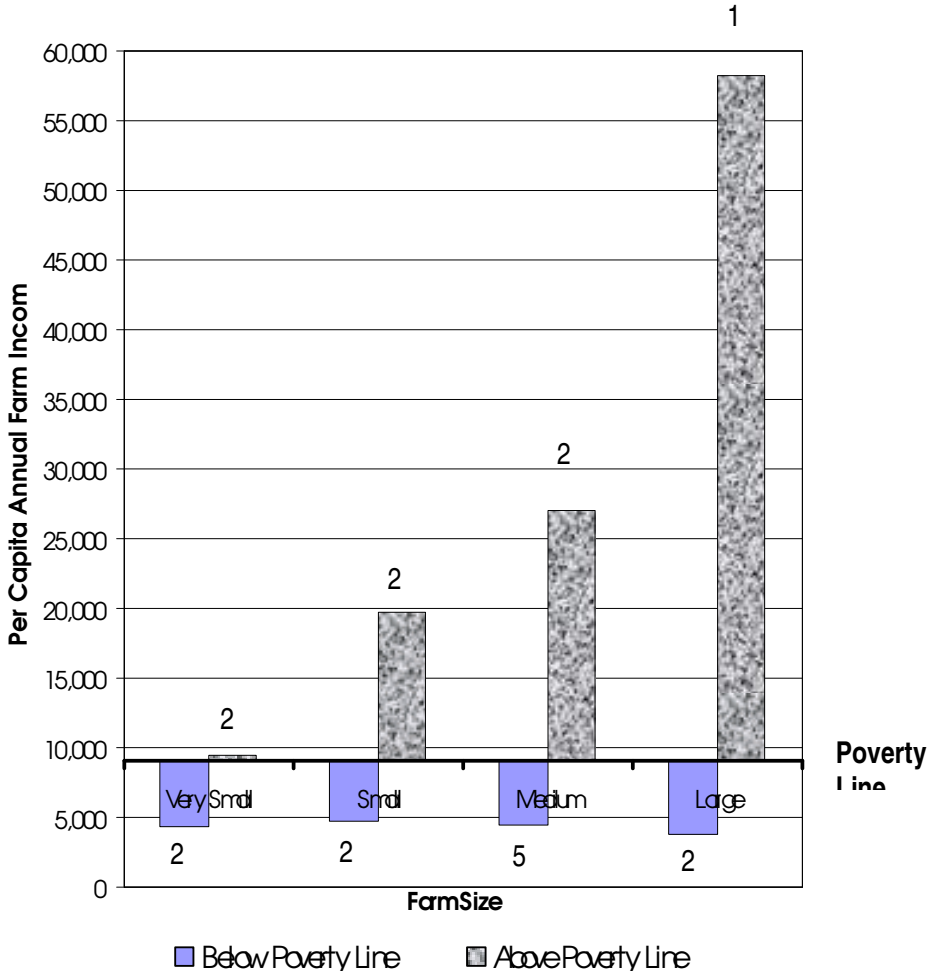
Strata	Farms Below Poverty (%)			Change in Average Income Levels (%)	
	Based on Total Income	Based on Farm Income	% Change	Below Poverty	Above Poverty
1. Farm Size					
Very Small	5	92	17	18	40
Small	36	51	15	28	09
Medium	10	17	07	43	10
Large	08	15	07	25	09
2. Tenure					
Owner	26	40	14	31	04
Owner-cum-Tenant	20	20	0	264	26
Tenant	68	80	12	12	16
3. Region					
Nara	39	47	08	21	10
Left Bank	45	52	07	27	07
Right Bank	15	45	30	–03	–06
Ghotki	26	42	16	57	–01
4. Farm Location					
Head	33	41	08	41	02
Middle	39	61	22	03	20
Tail	36	50	14	05	33
5. Watercourse Location					
Head	42	52	10	08	16
Middle	23	44	21	22	–06
Tail	40	47	07	30	10
Overall	35	47	12	24	04

Source: Derived from detailed appendix tables.

8.1.4 Depth of Poverty

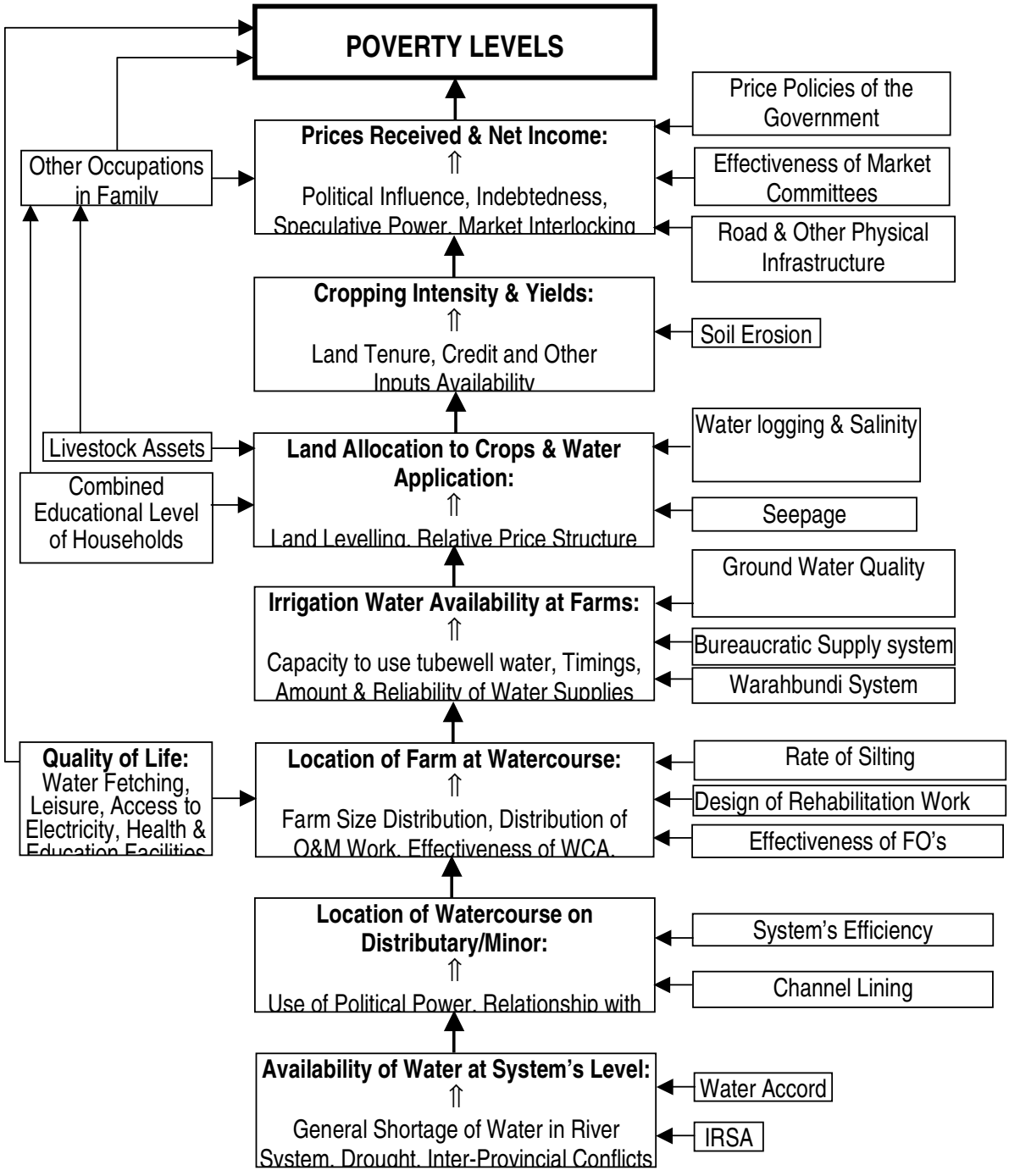
The depth of income poverty were also measured to show the sources that create poverty gaps. The Charts 8.1 to 8.5 highlight the depth of poverty based on farm income levels and are based on information contained in tables B-25 to B-28. The charts reinforce the earlier discussion on income poverty levels.

CHART – 8.1
PER CAPITA ANNUAL AGRICULTURAL INCOME OF FARMS BELOW AND ABOVE POVERTY LINE BY FARM SIZE



Numbers on Bars show # Households.
Source: ISEA Household Data, 2004

CHART-8.2:
DETERMINANTS OF POVERTY IN PAKISTAN's IRRIGATED AGRICULTURE



8.2 PERCEPTION OF FARMERS

The data was collected through household/farm level survey of 121 respondents sampled from 12 distributaries/minors (hereinafter referred as villages) including the control group. The presentation of collected information and the analysis is divided into quantitative and qualitative modes of analysis. Accordingly, the socio-economic aspects covering farm level factors are highlighted first which is followed by views, perceptions and assessment of farmers over the efforts being made under the Water Sector Reforms including WSIP.

During the household survey the respondents were also asked questions to seek their perception and assessment on different issues including F.O.'s membership, its governance, process of election, dominant group, joint management, health and environment related issues, drinking water, institutional and technical constraints, resettlement issues etc. The responses received for each issue is presented below:

8.2.1 Institutional issues

8.2.1.1 Awareness of Water Sector Reforms

Most of the participants (with the exception of Nara and left bank areas) were found largely ignorant about Water Sector Reforms, establishment of SIDA or its functioning, emergence of Area Water Board and above all their enhanced role and the degree of autonomy accorded to farmers under the reform. The general awareness of the people on the subject was largely concentrated over the apparent duality of functions/roles between Irrigation and Power Department (IPD) and SIDA. They do not regard this conflict as part of the transition during which IPD would become part of SIDA at the end. Their apprehension does carry some weight given the non-existence of exemplary traditions of development and sustenance of organisations and institutions in the area. As a consequence people largely focus on day to day events that they think affects them.

People largely demonstrated a sense of disassociation with new institutional changes in the water sector and future development works being initiated. They were largely concerned over non-dependability and erratic variations in the water supplies causing inequities in its distribution.

8.2.1.2 Dissemination of Information

The farmers were casting heavy doubts over the reliability of the announcements/promises made by the canal authorities (they largely attribute this to IPD and less to SIDA authorities) for the opening up of specific canal which they had closed apparently to ration out the limited supplies available. The farmers in many sessions advocated the idea to establish local radio stations to regularly disseminate the canal operation plan prepared by the canal authorities. The farmers agreed that such system will create a peer pressure on the authorities to strictly adhere to their schedules for water delivery.

It was also suggested that in order to increase the effectiveness of the system (which will undoubtedly increase the confidence and respect of farmers in the system) a third party validation may also be enforced. This validation will periodically assess the deviations from the announcement of water schedule and report for any judicial actions (if required).

The farmers also agreed to share the cost of partial lining of the irrigation channel on the understanding that it would ensure higher supplies to them through reduced seepage losses. This issue was heavily debated since at the beginning farmers were not in a mood to listen to any suggestion that requires them to contribute financially for the functioning of the system.

8.2.1.3 Non-Agricultural Use of Water

- The participants strongly criticised the water supplies made to Mirpurkhas city for the use of residents and industrialists/businessmen.
- The following specific points were indicated by the participants:

  i) The water supplies made to the city are not treated.
  ii) Every fifth person in the city is suffering from hepatitis A, B or C.
  iii) Contamination of water supplies with sewage water is common.
  iv) The water is supplied from Jamrao Canal through tanks which are not regularly cleaned and carry heavy silt.
  v) The water through boring of well is sold by local municipality at a rate of Rs.200 per tanker or Rs.30 per drum.
  vi) Water is apparently available in plentiful quantity but its quality is extremely poor.
  vii) Market for mineral water has increased several folds during the last 10 years or so.

- The participants suggested the following measures:
  i) Water supply system be privatized.
  ii) People are willing to pay a higher price if the quality of water improves (Currently only 30 percent pay water tax to municipality which is less than Rs.100 per household per year).

8.3 Potential social impacts and issues

The respondents were provided with information on various components of WSIP before seeking their views on the likely impact. A summary of potential impacts and issues highlighted by the farmers are articulated below:

8.3.1 Water Availability

The main apprehensions of the farmers were centered at current water shortages. Their views and perceptions were largely affected by the current shortages for which they hold the system to be responsible. As a result, their responses were extremely cautious. Nearly 85 percent related adequate water supplies with reductions in the levels of waterlogging and salinity. Around 14 percent considered WSIP to be a success but regarded it as a difficult task.

8.3.2 Impact of Direct Outlets (D.O.'s) and Lift Pumps

A total of 20 respondents either did not know about any impact or were confident that D.O.'s have no adverse impact. Of those who considered D.O.'s to have adverse impact on water distribution included those 59 percent who considered shortages at tail end to be its impact. Nearly 9 percent regarded lift pumps to deprive others right over water and 16 percent considered lift pumps to be inevitable due to higher elevation of land.

TABLE-8.3
IMPACT OF DIRECT OUTLETS / LIFT PUMPS ACROSS REGIONS

(Row percentage)

Impact	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No impact	1	100	–	–	–
Less water at tail	71	37	31	11	21
Due to high level of land, lift pumps are necessary	19	47	5	32	16
Don't know	19	47	16	32	5
Lift pump users deprive other	11	54	45	–	–
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.3 Farmers Organization (FOs)

8.3.3.1Membership of F.O. (Farmers Organization)

Only 14 households out of 121 (i.e. 11.6%) reported membership of F.O. and 76 clearly reported non-membership. A total of 31 (i.e. 25.6) never heard about F.O.'s. The dominant share of all F.O.'s in Sindh is in Nara region about 83 percent. This predominance is also reflected in the responses of farmers across all indicators in this section. As obvious, the right bank area which has been taken as control group has a dominant share in non-response category.

TABLE – 8.4
F.O. MEMBERSHIP ACROSS REGIONS

(Row percentage)

Value	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	31	–	36	64	–
Yes	14	72	14	–	14
No	76	54	24	–	22
Total	**121**	**42**	**26**	**16**	**16**

Source: Household survey data collected under the study.

8.3.3.2 Size of Land Holdings of President (Head) of F.O.'s

A vast majority i.e. 63 percent did not know the land holding of F.O.'s president. It may well be the fact that they knew but were reluctant to reveal because of the fear or that F.O. were not established in their area.

Of the 45 households who reported, the land size holding owned by F.O.'s president were as follows:

1.	Upto 16 acres	(Small farmers)	2	i.e. 2%
2.	16 to 50	(Medium farmers)	10	i.e. 22%
3.	50 and above	(Large farmers)	33	i.e. 76%

TABLE – 8.5
LAND OWNED BY PRESIDENTS OF F.O.'S AREA ACROSS REGIONS

(Row percentage)

Value	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	76	30	30	26	13
Upto 16 acres	02	100	–	–	–
16 to 50 acres	10	70	10	–	20
50 acres and above	33	58	21	–	21
Total	**121**	**42**	**26**	**16**	**16**

Source: Household survey data collected under the study.

The predominance of large landowners in controlling the affairs of F.O.'s is eminent from this classification. It in turn raises the issue that if over 82 percent of farmers in Sindh are small, their representation and control over F.O.'s seems on the contrary. The dominance of large farmers across project area is clearly visible.

8.3.3.3 Frequency of F.O.'s Meetings since its Establishment in the Area

A total of 33 households (i.e. 27 percent) did not respond because of non-existence of F.O. in their area. Of the total of 88 who responded, 8 (nearly 9%) reported no meeting, 15 (i.e. 17 percent) reported only one meeting, 52 (i.e. 59 percent) had 2 meetings. The rest 13 (i.e. nearly 15%) reported more than 2 meetings. The highest responses were concentrated around one or two meetings of F.O.'s with a dominant share of Nara region.

TABLE – 8.6
HOW MANY MEETINGS OF F.O. AFTER ITS INCEPTION ACROSS REGIONS

(Row percentage)

# Meeting	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	33	6	33	61	–
0	8	38	62	–	–
1	15	73	27	–	–
2	52	46	19	–	35
3	1	–	–	–	100
10	1	100	–	–	–
12	6	83	17	–	–
24	5	100	–	–	–
Total	**121**	**42**	**26**	**16**	**16**

Source: Household survey data collected under the study.

Though the frequency of F.O.'s meeting does not seem very frequent but it shows that F.O.'s are functional as compared to WCA's who rarely meet after the lining/civil work.

8.3.3.4 Effectiveness of F.O.'s

A total of 89 farmers responded whereas 32 did not on the pretext of not having any F.O. in the area. Of the 89, 15 (i.e. 12.4%) reported F.O.'s as very effective in carrying out their due functions. Nearly 37 percent (i.e. 45 farmers) were not convinced that the F.O.'s are effectively working. The rest 29 farmers thought these bodies as ineffective. The higher proportion of those who consider F.O.'s to be very effective is in Nara region.

TABLE – 8.7
EFFECTIVENESS OF F.O.'S ACROSS REGIONS

(Row percentage)

Responses	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	32	–	38	62	–
Very effective	15	53	27	–	20
May be effective	45	44	27	–	29
Not likely to be effective	29	79	10	–	11
Total	**121**	**42**	**26**	**16**	**16**

Source: Household survey data collected under the study.

The above mentioned responses reveal a mixed picture of F.O.'s effectiveness as perceived by the farmers.

8.3.3.5 Joint Management of Channel by F.O.

A total of 33 respondents had no knowledge (or relevance) to the question since the formation of F.O. did not take place in their areas. Of the remaining 88 respondents, 80 i.e. 73 percent were of the view that joint management of the channel is possible through F.O. The higher proportion of those affirming the question belonged to Nara region. The Ghotki region ranks second in this regard.

TABLE – 8.8
CAN FARMERS JOINTLY MANAGE F.O.'S ACROSS REGIONS

(Row percentage)

Responses	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	33	–	35.	65	–
Yes	64	58	17	–	25
No	24	54	35	–	11
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

In view of the responses on the effectiveness of F.O. (discussed earlier) the responses on joint management of channel by farmers seems a reiteration of the confidence and hope the farmers still carry for their active participation in canal water management. This in a way affirms the design of the irrigation sector reforms in Sindh. However, their worries, apprehensions and constraints in this regard need adequate attention of the policy makers.

8.3.3.6 Joint Collection of Abiana

A similar pattern of responses was observed in view of the F.O.'s capacity to collect abiana as observed in case of overall management of channel by F.O.'s.

TABLE – 8.9
CAN FARMERS JOINTLY COLLECT ABIANA ACROSS REGIONS

(Row percentage)

Responses	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	32	–	35	65	–
Yes	80	57	19	–	24
No	9	50	50	–	–
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

A higher percentage of respondents showed their confidence (i.e. 80 out of 89) in abiana collection by F.O.'s. A higher degree of confidence on the capacity to collect abiana also in turn shows farmers lack of confidence on government officials in abiana collection. Furthermore, the empowerment of F.O. to retain 40 percent of abiana collection and to use it on the up-keep of the channel may be a driving force in showing higher confidence level.

8.3.3.7 Institutional Constraints

A vast majority i.e. 78 percent either did not know of any institutional constraints in the formation of F.O.'s or simply the F.O.'s were not established in their areas. Nearly 20 percent, however, argued that the good governance of WCA (Watercourse Association) is a precondition for an effective F.O. This proportion is though small but nevertheless points towards an extremely essential component of overall irrigation sector reform. It means that the institutional strengthening at the lowest level i.e. watercourse level (WCA) needs to be vitalized if the onward movement/involvement of farmers at channel, Area Water Board (AWB) is to be meaningful.

TABLE-8.10
INSTITUTIONAL CONSTRAINTS ACROSS REGIONS

(Row percentage)

Constraints	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	94	41	28	21	10
If watercourse are rehabilitated, only then F.O. will work	24	37	21	–	42
No apparent snags	3	100	–	–	–
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.3.8 Farmers Representation at F.O. Level

Nearly 56 percent reported no representation of farmers. However, these also included those where no F.O.'s have been established. Nearly 29 percent were indifferent due to shallow knowledge on the issues. The rest i.e. 15 percent were of the view that influential farmers are represented at F.O. level.

TABLE-8.11
FARMERS REPRESENTATIVE ACROSS REGIONS

(Row percentage)

Status	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No representative	68	32	22	25	21
Don't know	35	57	26	6	11
Perhaps big landlords	9	44	33	11	11
Elected at UC level	7	71	29	–	–
Obliged due to turn	2	–	100	–	–
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

The pattern of responses on the issue of representation shows lack of ownership of the majority who either do not actively participate in the formation of F.O.'s or consider it to be a part of the status quo which will not change.

8.3.4 General Health Level Problems

A predominantly high proportion of respondents i.e. nearly 97 revealed various diseases in the area in general. The highest reporting was for malaria. Over 88 percent reported malaria. The incidences of tuberculoses and hepatitis are also not uncommon in the area.

It appears that standing water and improper drainage facilities have aggravated the health problems in the area. The reporting of large-scale incidences of malaria is consistent with the general assessment that malaria and other diseases are re-appearing in Pakistan. Tables carrying greater details have been provided in Appendix - "B".

8.3.5 Medical Expenses

Given the general income levels of rural households, a significant proportion of the respondents reported monthly medical expenses on health. Nearly 48 percent of the households reported an expenditure of Rs.100 to Rs.500 per month on health. Appendix – Table B.3 provides information on the pattern of medical expenses incurred across various categories of medical expenditure.

8.3.6 Water Related Health Problems

As reported above, the incidence of malaria, hepatitis and stomach related ailments are largely associated with water. A total of 97 out of 121 cases reported these ailments and considered them to be caused by water.

The severity of the health related problems abundantly shows that the problem is largely related to water and its management. The reported incidences of sickness due to water related factors were also verified during FGD's.

8.3.6.1 Current Sources of Drinking Water

Table B-4 provides information the current sources of drinking water by the respondents. A vast majority (66%) receives water from hand pumps followed by 20 percent who use canal water. Another 8 percent receive water through pipes. There were no reporting of water supplies

through tankers in rural areas. However, in urban areas (e.g. Mirpurkhas) where during FGD's presence of tankers was reported. The reported level of cropping intensities in the sample are does not suggest that the recharge from the canals could be so low to affect hand pumps water supplies.

8.3.6.2 Earlier Sources of Drinking Water

This question was asked in the context of any water related development work either directly focused on drinking water or indirectly through improvement in the canal supply system. In comparison with current sources (discussed above), the picture revealed by Table B.5 of earlier sources shows that significant improvements have taken place.

The extent of hand pump users increased by 22.3 percent. Similarly, the users of piped water supply increased by 5.8 percent. Consequently, the extent of reliance on canal water reduced by 28.1 percent. It appears that the situation of rural water supply particularly with respect to its quality is improving somewhat. Still, the severity of health problems reported particularly those related with water require significant steps yet to be taken.

8.3.6.3 Distance to Source of Water

Over 80 percent reported no distance to the source of water. It verifies the earlier finding that most of the users have hand pumps or piped water supplies at negligible distance. The estimated levels of cropping intensities do not support such drought condition which may have adversely affected location of water.

8.3.6.4 Change in Fetching Water

No change in fetching water was reported as a result of canal rehabilitation work. It implies that the changes reported earlier were largely direct and were caused by schemes/programmes of rural water supplies in the area.

8.3.6.5 Qualitative Change in the Supply of Water

Nearly 75 percent of the respondents, however, maintained that no qualitative change was observed in the water received with the advent of rehabilitation of canals. Wherever or whenever it took place. The reported level water related sickness (discussed earlier) also tend to verify that water quality did not change though the quantity of water received did not change ostensibly.

8.3.7 Constraints in Livestock Movements

A vast majority i.e. 89 percent reported no constraint in the movement of livestock as a result of any canal rehabilitation work. This proportion of responses, however, included those as well who reported no rehabilitation work.

TABLE – 8.12
DID THE WORK CAUSE ANY CONSTRAINT TO LIVESTOCK MOVEMENT ACROSS REGIONS

(Row percentage)

Value	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No response	2	100	–	–	–
Yes	11	73	18	–	9
No	108	38	27	18	18
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.8 Technological Constraints

The questions asked was open ended and was related to the technical constraints as perceived by the farmers. Of those who reported (i.e. 75 out of 121), nearly 20 percent considered the difference in water level of the channel and watercourse head, and water shortages particularly at the tail end. Over 18 percent considered it a legacy of the irrigation department performance to be the cause of technical constraint in improving water deliveries.

TABLE – 8.13
TECHNOLOGICAL CONSTRAINTS IN IMPROVING WATER DELIVERIES ACROSS REGIONS

(Row percentage)

Constraints	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not relevant / Don't know	46	43	37	9	11
No constraints now	12	83	8	–	8
Issue of water levels	12	50	25	–	25
No work done	16	37	19	–	44
Water shortage	7	43	29	29	–
Tail enders suffer	5	40	20	20	20
Legacy of irrigation department ineffectiveness	22	14	18	59	9
Government is better than FO	1	100	–	–	–
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.9 Environmental Issues

The question was asked in the context of waterlogging and salinity. Over 75 percent of the respondents considered salinity levels to be the cause of environmental degradation in the area. Nearly 10 percent regarded it as an outcome of lack of proper drainage of rainwater. However, 14 percent reported no environmental issues as an outcome of development work on irrigation.

Table – 8.14
Environment Related Issues Across Regions

(Row percentage)

Issues	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Salinity causes health problems	12	67	33	–	–
Improper drainage	1	–	100	–	–
Salinity causes health problems + improper drainage	79	38	23	23	16
No environmental issue	17	47	23	–	29
No rain water disposal	12	42	33	17	8
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.10Social Taboos

A vast majority i.e. 87 percent did not report any social taboos or obstacles in improving irrigation system. Few were of the opinion that the tenants bear most of the burden. However, it

must be noticed that the status quo, in which the tenants are given larger share of water related work, is considered equitable share of work (which is itself a taboo).

TABLE – 8.15
SOCIAL TABOOS ACROSS REGIONS

(Row percentage)

Social Taboos	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Equitable share of work	105	38	27	17	18
Haries do all	10	80	–	20	–
Watercourse is lined (no constraint)	1	100	–	–	–
Feel it is government job but do it on their own	4	50	50	–	–
Lift pump creates inequalities	1	–	100	–	–
Total (No. of Farms)	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.11 Possible Impact of WSIP

This question was open-ended. However, the respondent was provided information on various components of WSIP before seeking their views on the likely impact. In response to the activities to be carried out under WSIP, the main apprehensions of the farmers were centered at current water shortages. Their views and perceptions were largely affected by the current shortages for which they hold the system to be responsible. As a result, their responses were extremely cautious. Nearly 85 percent related adequate water supplies with reductions in the levels of waterlogging and salinity. Around 14 percent considered WSIP to be a success but regarded it as a difficult task.

TABLE – 8.16
POSSIBLE IMPACT OF WSIP ON WETLAND, WATERLOGGING AND SALINITY ACROSS Regions

(Row percentage)

Impact	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No impact	1	100	–	–	–
May be	13	92	–	–	8
Different but may improve	4	50	50	–	–
If more water, waterlogging and salinity will reduce (implying sufficient leaching down of excessive salts)	103	35	28	19	17
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.3.12 Potential Resettlement Impacts

Component B of the Project will cover the improvement of irrigation and drainage system including implementation of modernization works, water metering and control structures and programs at all levels of the selected command areas in the jurisdiction of the three AWBs. The investment related to improvement of main and branch canals of Akam Wah may be included in the future project after completion of detailed design, and environmental and social assessment studies. For Ghotki, Nara and Fuleli canal systems the Project would cover some 700 km of

main canals and 1400 km of branch canals. These works are likely to result in some adverse impacts, both permanent and temporary, on private assets and may also cause loss of income and livelihood of some households in the vicinity of the canals. Some of these canals banks are encroached upon by squatters who may be adversely affected due to the rehabilitation works that may be proposed in the project. Additionally, there may be a need to address the relocation issues arising from emergency flooding in the lower Badin areas. However, precise impacts of these works can only be determined during the project implementation after detailed designs for rehabilitation/improvement of main and branch canals systems are prepared and feasibility studies for coastal development are completed.

Rehabilitation and improvement work for the distributary/minor canals will be undertaken by FOs. The scale of the work envisaged is small and any loss of land or adverse impacts on private assets is not expected. However, the design report for each the lot of five distributaries would be prepared following the environmental and social screening process and will outline, in addition to technical design aspects, the major issues and environment and social impacts, together with appropriate mitigation plans, that would have to be accounted for in design and construction management.

In view of proposed activities under WSIP, the resettlement was not regarded as a significant issue by the majority (i.e. 56%) but 44 percent have reasonable doubts. Over 30 percent were worried that insufficient land will be given through resettlement. Over 13 percent were of the view that low quality of land will be given in exchange.

TABLE – 8.17
RESETTLEMENT ISSUES ACROSS REGIONS

(Row percentage)

Issues	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No big issue	68	139	34	19	7
Insufficient land given	37	32	13	16	38
Low quality land given	16	129	64	7	–
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

8.4 SUMMARY OF SOCIAL IMPACTS, CONSTRAINTS, MITIGATION & ENHANCEMENT MEASURES AND RESPONSIBLE INSTITUTIONS

The effective participation of farmers in the irrigation system management, as reflected through Water Sector Reform, is strongly linked to the degree to which the representation of small farmers (constituting over 80 percent of the total) and the tail enders remains equitable and transparent. Unless a proportional representatives of all groups of farmers in the affairs of the system, whether it be at the watercourses or FO (Farmers Organisations) or AWB (Area Water Board) level, is ensued and observed, the current levels of inequities in the distribution of water to farmers will continue to restrict the emergence of an enabling environment conducive to the long term sustainability of the measures taken under the reform.

In addition to proportional representation, the added factors of misconceptions caused by current definitions of small farmers and tail enders and assurance of adequate representation of the landless and the women would be pivotal for the maximum participation of all water users. In

order to qualify as small farmers, an owner of agricultural land of 16 acres or less will have to provide a legal undertaking that he / she does not own any other agricultural land in Sindh. Similarly, the definition of tail ender shall mean farmer located at the tail of a watercourse which is itself at the tail of a distributary or a minor.

Wherever the current efforts under the reform aim at devolution of responsibilities, it is imperative that all other sectors or sub-sectors of the provisional local government are simultaneously introduced the devolution plan of their respective sector or sub-sectors. A close coordination among all such sectors or sub-sectors with ensure efficiency gains. Being a radical change in disseminating system information the performance of Project Management Support Component could be subjected to criticise from within the system, as it could create the basis for public accountability. Hence, the activities undertaken in this regard with need maximum legal protection and be made public through a website.

In the event the periodic review and impact evaluation is conducted internally, the prospects for an impartial and free from conflict of interest monitoring and evaluation may diminish. It would therefore require that the task be performed by an institution outside the normal government structure.

Based on the findings of field works and analysis of social impacts, a summary of the same along with the constraints, mitigation and enhancement measures is presented in Table 8.18 identifying the responsible institutions for each item.

To address social safeguard issues that may be caused by any of the rehabilitation and civil works activities in the Project, a SIMF, incorporating social screening process, is prepared for the Project. Full design report for each canal system and the design reports for rehabilitation and improvement works for the distributary/minor canals would include, in addition to technical aspects, a social impact assessment report, incorporating social safeguard issues i.e. specific impacts on assets, incomes and livelihood, and any impacts on vulnerable groups including nomads and migratory indigenous groups; and appropriate mitigation measures and necessary safeguard documents in accordance with the provisions of the SIMF. Upon approval from the Bank, these design reports would form the basis for preparing the bidding documents for carrying out the construction works.

To address social safeguard issues that may be caused by any of the rehabilitation and civil works activities in the Project, a SIMF, incorporating social screening process, is prepared for the Project. The SIMF (Appendix D) provides the overall guidance on process and procedure required for addressing social impacts caused by the sub-projects and for social screening, and preparation and implementation of Resettlement Plans (RPs), and /or other mitigation plans as necessary. The RPs will describe distinctly and clearly how the sub-project would improve, or at least restore economic livelihoods of Project Affected Peoples (PAPs) through adequate asset compensation and economic rehabilitation measures.

TABLE 8.18

WATER SECTOR IMPROVEMENT PROJECT

Summary of Social Issues, Potential Impacts and Recommended Mitigation Measures

Activity	Impact	Potential Constraints	Required Mitigation & Enhancement Measures	Responsibilities		
				Implementation	Supervision	Monitoring
1. Capacity Building + Community Organization	1. Greater participation of farmers in water management system at FO & Watercourse levels.	1. The prospects for greater involvement of farmers may reduce unless representation of small farmers and tail enders truly reflects their proportions in the total.	1. To number of small farmers and tail enders as representative of their respective groups at AWB and SIDA be determined in proportion to their share in the farming community.	AWB	SIDA	M & R Consultants
	2. Representation of farmers at the upper tier of the system i.e. AWB and SIDA.	2. In addition to the proportions, the true representation of small farmers and tail enders will not be achieved unless these terms are correctly defined. Failure to do so may cause collusion that may take place between large farmers and authorities at the cost of ignoring the interests of a vast majority of farmers.	2. The terms such as small farmers and tail enders, as used in Sindh Water Management Ordinance (Oct. 2002), be redefined as: i) Small Farmer: An owner of agricultural land of 16 acres or less provided that he/she does not own any other agricultural land in Sindh. ii) Tail Enders: Those farms located at the tail of such watercourses which are at the tail of a distributary/ minor.	FO & WCA	AWB	M & R Consultants
	3. The landless and women may also benefit through their active participation at WCA/FO levels.	3. In the absence of proper representation of the landless and the women, horizontal inequities may be created. Those left out will not adequately benefit from the project.	3. The sharecroppers and women, wherever applicable, be given atleast some representation at WCA and FO levels e.g representation of formal association on WCA & F.O.	WCA & FO	AWB	M & R Consultants
2. Devolved structure and demand orientation of the system.	1. Delegation of powers to farmers, will be consistent with the objective of devolved government structure at local levels.	1. If the devolution plan is not implemented across all sectors or sub-sectors concurrently, the pace at which the decentralization of the irrigation system is planned may retard.	1. In improving the efficiency of water use, the other components of the devolution plan, e.g. community based school management committees (SMCs), PHED level activities and agricultural extension programs, be closely coordinated to acquire maximum benefits from the complementarities reposed in such activities within a devolved structure..	Education Deptt./ Public Health Engg. Deptt./ Agriculture Deptt.	FO	Local Government

3. Improvements in main / branch canal system (to be undertaken at AWB level).	1. Reduction of water losses above distributary level and improvement in water use efficiency at system level.	1. Inequitable membership, the farmers would be de-motivated to participate in the system's management. This way the central theme of the sector's reform (which hinges on user participation and making the entire system a demand oriented one) would be badly shattered.	1. A larger proportion of farmers at WAC Committees i.e. a minimum of 51 percent, be maintained in order to ensure effectiveness of farmers participation.	AWB	SIDA	M & R Consultants
	2. Loss of assets, income and livelihood.	2. Resistance from PAP's, Landowners and Politicians.	2. Social impact management framework	AWB	SIDA	M & R Consultants
4. Project Management Support Component	1. The development of a management information system and training would be a key factor in determining the transparency of the system.	1. Being a radical change in disseminating system's information, it could be subjected to criticism from within the system, as it would create the basis for public accountability.	1. This activity be given maximum legal protection and be made public through a website 2. There is a clear need for establishing a Project Directorate for WSIP (Phase-I) Project	Project Directorate WSIP-Phase-I	SIDA	M&R Consultants
	2. The periodic review and impact evaluation would help estimate economic / social rate of return on such massive capital investment	2. There is a high risk that such a task may be conducted internally which may conceal weaknesses in the design and/ or implementation process.	2. In order to remain impartial and free from conflict of interest, the task needs to be conducted by an institution/firm outside the normal government structure.	M & R Consultants	SIDA	Local Government

9. CONCLUSIONS, RECOMMENDATIONS AND IMPLEMENTATION FRAMEWORK

9.1. Conclusions

1. Water is indeed the most crucial natural resource for Sindh, and irrigation and drainage system is the lifeline of civilization, livelihood and economy of Sindh. Therefore, improvements in I&D system proposed under WSIP are essential. The root causes of poor water use efficiency arise from two-pronged deficiencies. First, the effectiveness of the institutional framework designed to provide water to farms is weak. The lack of water user's participation in the functioning of the system and the transparency of the functioning of the system are considered vital factors in improving water delivery efficiency. Second, the perpetuation of recurrent subsidy in irrigation sector and lack of adequate cost recovery have not helped improve water use efficiency at the farm and watercourse levels. Historically, collections from water charges (*Abiana*) have not accounted for more than 40 percent of the annual repairs and maintenance cost of the system. The weakness identified in analysis for project design and approach adopted to address the institutional reform program through participatory irrigation management by strengthening of FOs and enhancing their participation in SIDA and AWBs is most suitable. The implementation of this approach would need careful monitoring and adjustments during the project implementation in order to address some of the issues which may arise during project implementation period.

2. Transparency and accountability in distribution of water and O&M of I&D systems is the major concern that has to be addressed through WSIP-I through greater decentralization and participatory irrigation management approach with greater role of beneficiaries in decision making. To that end, the reform package in the water sector being introduced by the government has rightfully established Water Allocation Committees (WACs) at four different tiers of the system (SIDA, AWB, FO and WCA) with adequate representation of farmers. However, persistent implementation of these reforms is left to be seen.

3. It is crucial to strengthen FOs' capacity through technical assistance and training, institutional building, organizational skills and management of I&D system in order to achieve the objectives of improving the water resources management. A clear role of FOs in the collection of water charges and authority to take actions against defaults has to be reflected in FOs bylaws. Currently, AABDARS (canal patwari) who are employees of SIDA are also involved in Abiana assessment that negates the empowerment of FOs.

4. At the beginning, a quota for women and sharecroppers at FO level would ensure higher and effective representation of farmers and marginalized groups. The FOs can then be better endowed to carryout the task of social mobilization. The empowerment of the FO Council will also compliment this effect. The role of effective NGO s in this respect can hardly be overemphasized.

5. There are no indigenous people historically attached to the land in the project area which may be affected. However, there are indigenous people who generally work as laborers in the project area and their issues are similar to day laborers and haris. They would be indirect beneficiaries of the project due to increased cropping activities and demand for labor, and hence income earning.

6. Inequitable distribution of irrigation water is widely practiced in Sindh. The incidences of Direct Outlets (DO), undue use of lift pumps and misuse of water allocations for orchards are the major factors responsible for such variations. Also, the location of farms (head, middle or tail) and variations across farm size groups, tenure status and the political power of certain farm owners contribute to water distribution inequity.

7. Availability of safe drinking water is a major issue which would be resolved to some extent by improving irrigation supplies, but needs to be addressed through properly designed intervention. The citizens of Mirpurkhas municipality reported substantial increase in the use of mineral water (from 20 to 25 cartons per month 10 years ago to a current monthly consumption of 600 trucks loads of mineral water). They also showed the willingness to pay 2 to 3 times higher water charges to the municipality (local government) for the water supplies if the quality of water is improved through treatment plants. Pilot projects may be carried out to develop low cost methods improving the water quality, protecting water supplies by separating wastewater and its safe disposal, and other means of improving water quality for possible scaling up later through other projects.

8. In terms of the perceptions and assessment of farmers over the governance of irrigation system, health, environment, and domestic use of water, the following conclusions are drawn:

   i). A vast majority (84 %) of farmers within the Area Water Board are not members of Farmers Organization (FOs)

   ii). The distribution of land size holdings of FOs presidents shows that out of the reported responses 73 percent were large land owners.

   iii). The regularities in FOs meeting were largely reported in Nara region, which accounts for 83 percent of established FOs in Sindh.

   iv). There was a mix response on the perceived effectiveness of FOs. It was, however, interesting to note that higher apprehensions were reported from

Nara.

v). A significant proportion of respondents were of the opinion that FOs can jointly manage the channel and the abiana collection.

vi). On the health front, a vast majority (86%) reported diseases like malaria, TB, hepatitis, skin problems, of which over 80 percent are waterborne diseases. Consequently, a significant proportion (36%) of consulted respondents reported monthly medical expenses of Rs. 500 or more. Although there has been some improvement towards better drinking water sources over time, such as hand pumps and piped water supplies, the quality of water for domestic use is reported to be extremely low. In the entire urban area of Mirpurkhas city, there is no treatment plant.

vii).Increased level of soil salinity was reported and was considered pivotal in degrading the environmental condition in the area.

viii). The situation of farmers' representation at FO level was found very bleak. A vast majority was totally uniformed about the process of representation at FO level.

ix). A vast majority of farmers knew nothing about WSIP and its likely impact on wetland, waterlogging, and salinity levels. They were of the view that if additional water supplies are ensured to sufficiently leach down the excessive salts, the extent of salinity could be reduced.

x). Nearly 60 percent of respondents were of the view that Direct Outlets (DO) and lift pumps cause shortage at the tail.

xi). Nearly two-thirds did not consider the issue of resettlement to be a significant consequence of WSIP.

xii).A large part of FGDs participants knew virtually nothing about WSIP. They were more concerned over the apparent duality of functions (as they perceived) between IPD and SIDA.

xiii). With the exception of Nara region, farmers in other areas were as ignorant about the institutional arrangements being made under the Water Sector Reforms as farmers in the control group area i.e. right bank area.

xiv). Farmers were more vocal over the inconsistencies between the dates and timing of canal openings (as announced by IPD) and what they actually observe. They, however, did not attribute this inconsistency to SIDA. Farmers advocated for a more reliable and accountable system of adherence to the announcements with regard to canal opening. They wholeheartedly agreed that a local radio system (FM band) be introduced for reliable and efficient announcement with regard to canal operations as well as other aspects of farming.

9. Currently, there is no indication as to which body will directly be responsible for the overall governance of WSIP-Phase-I. There is no mention of establishing a Project Directorate as normally done in project preparation.

9.2. Recommendation and Mitigation Measures

1. The environmental study carried out indicates that the environmental impacts of the project are overwhelmingly positive and of permanent nature for the ecosystem, socio-economic growth and improvement of human life style, except during construction phase when some impacts are likely to be negative but will be temporary and can be fully mitigated. The wetlands protected areas are not going to be affected by the project interventions. No archeological sites will be affected by the project. The implementation of the Project is, therefore, strongly recommended.

2. Institutional strengthening and capacity building of SIDA, AWBs and, in particular FOs is crucial for transformation of the purely government management I&D system to decentralized system of management with participation of beneficiaries. The technical assistance and training to be provided under WSIP to FOs in the form of staff and through social mobilization unit of SIDA is a good approach. These arrangements may be monitored during project implementation (including the performance of FOs) and adjustments made to the assistance program to better suit the needs of FOs as they emerge with greater role in management of the distributaries and minors.

3. Social mobilization has to be accompanied with good communication strategy. Particularly, information about water allocation, rotation of flows to distributaries and minors, and O&M plans and expenditures of the system should be disseminated widely through internet (placing on SIDA and AWBs website and if some FOs develop their own websites) and broadcasted on an local radio (FM band).

4. Lack of adequate and safe drinking water is a major problem resulting in health issues of epidemic proportion and population is interested in addressing this issue. One way to broaden FOs base to other water users, in particular to haris, labor and women (who play a major role in securing water for domestic use) would be to do some small scale pilot project for improving water supply with FOs who involve and extend membership to other water users preferably to tenants, haris and women.

5. The Environmental Management and Social Units of SIDA should be strengthened in order support implementation of EMF/EMPs under the project and also to improve SIDA's capacity in planning, development and operation of water resources management systems with proper consideration to environmental issues and participation of stakeholders in order to make water systems sustainable in the long run and generate higher benefits.

6. The left bank area of the Indus River in which three WSIP AWBs are located has been suffering from storm drainage and flooding problems in the recent years. Also there are several problems in the Left Bank Outfall Drain's (LBOD) effluent disposal system causing environmental damages and social issues. The Indus delta and coastal zone also is suffering due to reduced surface water flows and degradation of water and land resources. In both storm and flooding issues and delta and coastal zones, several solutions are being proposed. These issues are very complex and solutions considered have wide ranging implications. It is necessary to have a comprehensive analysis of the situation on the ground with full examination of alternative solutions in participation with the local communities,

NGOs and different stakeholders. The studies proposed under component C of the project would be of great assistance in addressing these issues. However, they should be carried out with detailed technical, topographic, information and participation of stakeholders at all stages of conceptualization, preparation, feasibility study and design of alternatives. This may be done through a three staged approach with consultation with all stakeholders so that final outcome is acceptable and can be implemented in most effective way.

9.3. Implementation Arrangements

The implementation of EMF and SIMF are fully integrated into the project design. As mentioned above detailed design of subproject works would be prepared during the project implementation period. Therefore, the approach is to prepare subproject specific EA/EMPs, Social Assessment and RPs, following the provisions of the EMF and SIMF for each contract that would be implemented under the project. Depending upon nature, scale and complexity of works, subproject/contract specific EA would assess general as well as site specific environment issues and implementation of EMP would be included in the contract and addressed under the Project. Separate EA /EMPs/SA and RPs would be prepared for the three major construction contracts related to rehabilitation main and branch canals - Ghotki, Nara and Fulleli - as part of the detailed design report identifying overall and site specific environmental issues along with the management plans. In case of rehabilitation of distributaries and minors the detailed design reports would be prepared for a group five distributaries that are adjacent or as close as possible. The design reports would also include EA/EMP and RP{s in addition to the technical designs and form the basis of bidding documents. The contract specific EA/EMP would be reviewed and cleared by the M&E consultants (reporting to PCMU) who are also responsible for monitoring and supervision of the environment and social management plans in addition to project impact assessment.

9.4. Cost of EA/EMPs and RPs

The cost of EA/EMP and RPs implementation is included in the Project (components A for SIDA EMU and Social unit, and B for civil works). Major part of the mitigation measures would have to be incorporated in the construction contracts. Some (for example, IPM studies) may be funded through Component E of the Project. The cost for designs and preparation of sub-project specific EMPs and RPs is included in the cost of PICs (Component B). Cost for monitoring and supervision of EMF/EMPs and RPs is included in the component D M&E consultants and E.

9.5. Institutional Setup and Monitoring Arrangements

SIDA is the primary implementing agency for the Project. Its EMU would be strengthened by supporting seven additional professional positions (Deputy Director of EMU, an environmental specialist, ecologist, hydrologist, sociologist/participation specialist and environmental inspectors). SIDA's Social Unit would also be strengthened under the project by providing about 20 additional staff (including for social mobilization and support to FOs). SIDA's EMU and Social Units would work closely with PICs to ensure that EMF/EMPs and RPs are prepared and implemented properly. The monitoring of EMF/EMP and RP implementation would be done by the M&E consultants reporting to PCMU in the Planning and Development Department of Government of Sindh. The PCMU would be provided with a small unit with about five staff for overseeing M&E of project impact as well as implementation of EMF/EMPs and RPs.

APPENDIX –A:INUNDATION OF BADIN AREAS

1. INUNDATION OF BADIN AREAS

1.1. Introduction

Badin district lies at the tail end of the Sindh's irrigation system. Time and again it has faced flooding which has destroyed urban properties and standing agricultural crops. There is a need to find an engineering solution to save this area from flood ravages. Topographical and hydrological data like contour levels, drainage and canal systems, general land slopes, rainfall intensities and runoff characteristics, irrigation practices, cropping pattern and canal system operation must be known before attempting to find the solution. Badin district and its agriculture area and its main towns suffer from double disadvantage being the lower reparians of Indus basin irrigation system. It suffers from irrigation water scarcity being at the tail end and receives all the drainage water of the recently completed LBOD system. The coastal plain marshes and Arabian Sea are about 20 to 30 km from Badin town. Major towns and villages in the affected district of Badin are Badin Town (Population 355,460), Tando Bago (Population 11,939), Talhar (Population 6,521), Golarchi (Population 199,197), Tando Ghulam Ali (Population 9,304), Garahi and Jati (Population 7,782) are in district Thatta.

1.2. Location

Badin district (area 6726 sq.km) is located between latitude 24º and 25º North and longitude 68º-69º East. The district headquarter is Badin town about 100 Km south east of Kotri barrage (Hyderabad). It is on the right bank of Fuleli canal (14350 cusecs) and its branch canals. Similarly Akram Wah and Pinyari canals with a discharge of 4100 and 12763 cusecs respectively flow down in the area and not very far from Badin Town. Jati (district Thatta) is almost located on Pinyari canal. In the south (about 20 miles) is Runn of Kutch, salt plains and marshes. The population of Badin district as per 1998 Population and Housing Census is 1,136,044. [7]

1.3. Topography

Badin district on the left bank of Indus is the deltaic plain of Indus, built by the river over million of years by depositing silt brought from Himalayas. Fine silt particles 0.2 mm average particle size with little or no cohesion forms the main feature. General slope in the area is 1:10,000 towards the sea. The general ground level of Badin varies between RL+24 to RL+13 ft. above mean sea level, with Badin Town just 14 ft. above mean sea level, its distance from the sea is between 20 to 30 km. Major problem is drainage of the surface runoff as the flat lands have very small gradient.

[7] 1998-Provincial Census Report of Sindh Population Census Organization Statistics Division, Government of Pakistan, Islamabad May 2000.

1.4. Climate

Meteorology

One climate station each at Hyderabad and Badin cities and two partial climate stations one each at Khairpur Gumbho and Lowari Sharif are located in the Badin district (Map-1.1).

Climate

Under the Shamshad climatic scheme, the climate of the Badin district can be classified as a "subtropical double season hotland. The characteristics features of this climatic zone are low rainfall (less than 250 mm per annum) accompanied by high temperatures.

The mean monthly minimum and maximum temperatures in the winter season are approximately 9ºC and 26ºC respectively, with rare rainfall. In summer, the hottest month is June with a maximum daytime temperature that exceeds 45ºC. The area is not regularly influenced by the monsoons, however, short and intense spells of rains with total 80 mm of rainfall occur in July and August.

The post-monsoon summer maximum temperature varies from 34ºC to 37ºC with the weather becoming pleasant in November.

Meteorological data for the two nearest weather stations, Hyderabad (100 Km northwest of Badin) and Badin itself is presented in Figure-1.1, Figure-1.2 and Figure-1.3.

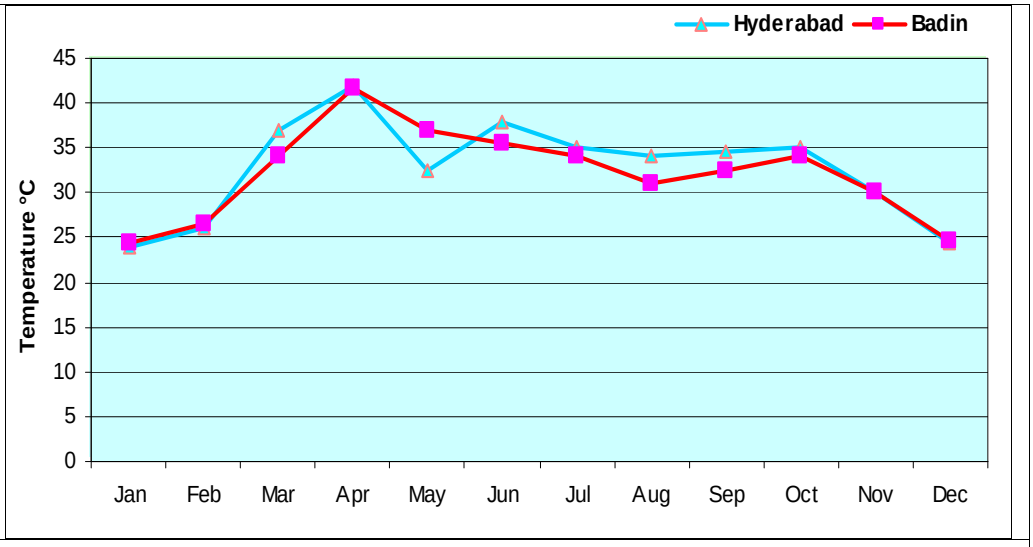


Fig 1.1: Average Yearly Variation of Mean Monthly Maximum Temperature for Hyderabad and Badin

Source: Based o n Met Department Data

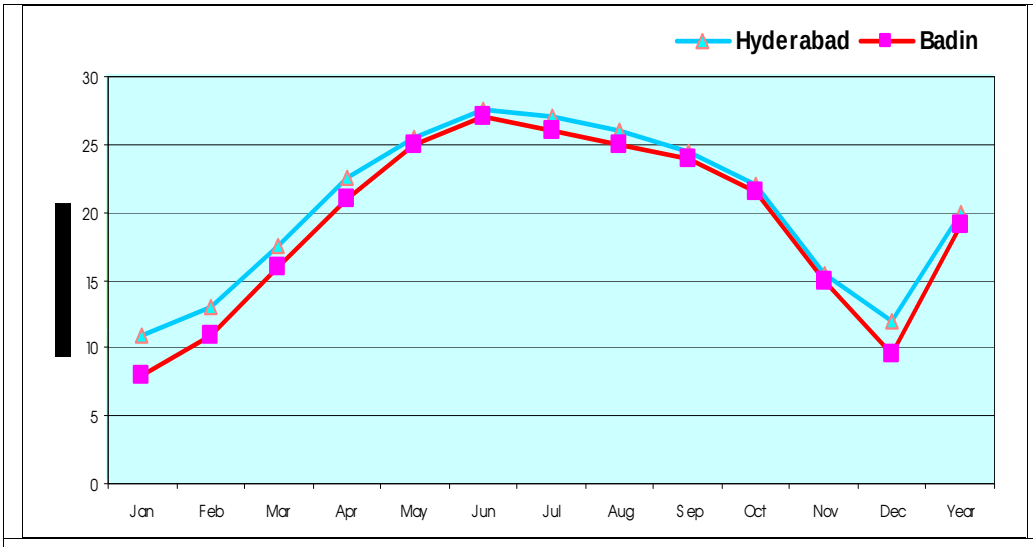


Fig 1.2: Average Yearly Variation of Mean Monthly Maximum Temperature for Hyderabad and Badin

Source: Based o n Met Department Data

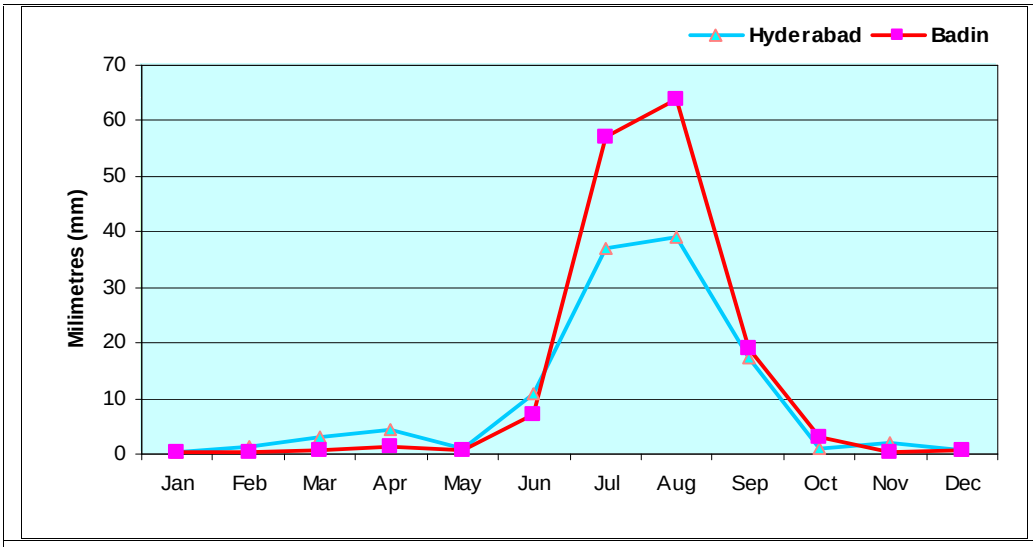


Fig1.3: Yearly Average of Mean Monthly Rainfall for Hyderabad and Badin

Source: Based o n Met Department Data

1.5. Cyclones

Cyclones are an enormous and disastrous natural phenomenon, which can even influence places more than thousand kilometers away. They are so energetic that if their energy can be trapped and tapped, just one average cyclone can provide fifty years of energy needs of Pakistan. The increased frequency of their occurrence and violent nature in the recent past may be attributed to global warming. Their birth, development, movement and dissipation are very well observed and recorded by satellites and can be scanned through satellite ground stations.

Although the Arabian Sea cyclones are comparatively less frequent and of lesser intensity than those in the Bay of Bengal, they influence the weather of Sindh and even other parts of Pakistan. They usually develop in the month of May-June and October-

November, Figure (1.4) and Figure (1.5) shows the track of severe tropical cyclones in the northern Arabian Sea during 1998-2001.

When they travel northward towards Pakistan even if they do not hit the Pakistan coast and even if they are weak, they induce thunderstorms and high intensity rainfall over Sindh & Punjab in general and Thatta and Badin in particular. If these areas are under low pressure weather system coming from the west then, their effect in terms of wind velocity and rainfall intensity becomes more pronounced and devastating.

This was the case in June 1996, June 1998, May 1999 cyclones and heavy rains in July 2003 that hit the Thatta & Badin district.

Their influence extends upto central Punjab if low pressure combines with cyclones. Faisalabad received rains for ten continuous days (June 13 to 22, 1996) and Lahore for eight days (June 15 to 22, 1996) even though 1200 km away from the cyclone.

Cyclone paths are highly erratic and a shift of a couple of hundred kilometers in any direction is always likely. Therefore coastal areas of Sindh (including Karachi much in the west of Badin) faces the chances of being hit by cyclones almost every year and if precautionary measures are not adopted may cause colossal damage to life and property.

The Sindh coast is critically located in the path of cyclones in the Arabian Sea. Statistics show that the frequency of cyclones in the Arabian Sea has been 0.86 per year for the period between 1891 and 1960, 1.25 per year for the period between 1967 and 1970 and 2.2 from 1992 to 1996. Around 75% of these cyclones hit the Oman coast in the west Arabian Sea while the remaining 25% curve clockwise and cross the coast near the Runn of Kutch on the Pakistan-India border. The Sindh coast is likely to be hit by a cyclone once in five to ten years.

Major cyclonic rains have occurred in recent past in 1995, 1999, 2001 and 2003; On May 19th 1999; the path of the cyclone that hit the Badin area can be seen in Figure (1.4). The cyclone had maximum core winds of approximately 100 knots with a storm surge of 9 to 12 feet.
Thousands of people were affected by the tidal waves, standing crops were badly damaged, and the communication system broke down completely.

The coastal belt of districts of Badin and Thatta, inhabited mostly by fisherman, were the worst affected and were declared “calamity-hit” areas. Over 5,000 villages were destroyed and 1,600 boats were damaged. Tracks of severe tropical cyclone in the northern Arabian Sea during 1988-2001 are shown in Figures (1.4) and (1.5).

On July 22nd, 2003, the heavy rains that hit the Southern Sindh in general and district Badin in particular is shown in Figure (1.6). Heavy rains, 292mm in 24 hours caused major flooding along the Indus river in Southern Sindh. Mud houses collapsed. The death toll rose to 60 and more than 50,000 people got stranded in the worst affected Badin district.

South western province of Balochistan was also affected as more than dozen people died due to rains. Parts of central Punjab province also experienced torrential rains which continued into the night. Heavy rains also hit the port city of Karachi, resulting in sever disruption. Fisherman were refrained from going out to sea. The other districts affected

were Thatta, Larkana, Dadu, Tharparkar and Skhiarpur. In all 1407 villages and 390,469 people were affected. About 11,889 houses were totally destroyed while 25,000 houses got partially damaged. According to relief Department Govt. of Sindh 9110 heads of cattle have perished and 229,931 acres of cropped area affected. Similarly large scale damage was caused in the districts of Jafarabad, Nesearabad, Bolan, Jhall Magsiand Harnai of Balochistan province.

The position of floods for July 29th and August 8th 2003 are shown in Figure (1.7).

1.6. Main Crops Of Badin District

Rabi and Kharif crops cultivated in Badin include wheat, barley, gram, pulses, rape seed, mustard and cotton, rice, sugarcane, jawar, bajra/millet, maize/corn, few pulses respectively.

Rice is cultivated where the soil is sandy, especially in the deltaic parts. Badin district also falls within the rice growing belt along with Jacobabad, Shikarpur, Larkana, Dadu, Thatta and Tando Mohammad Khan Taluka in Hyderabad district. Major crops and the crop areas are shown in Table 1.1.

Table 1.1
Major Crops of Badin District (2000-2001)

No.	Crop	Area (Hectare)
1	Rice	60,153
2	Cotton	64,309
3	Sugarcane	30,877
4	Wheat	1,629
5	Tomato	128
6	Chilies	1,679
7	Banana	2,641

1.7. Canal And Drainage System In Badin

The province of Sindh is served by three barrages, Guddu, Sukkur and Kotri with their extensive canal systems (Map.1.2).

Badin and its neighbouring districts come under the left bank command area of the Kotri barrage. Three major canals from the left bank of Kotri i.e. Fuleli (14350 cusecs), Akram Wah (4100 cusecs) and Pinyari (12763 cusecs) irrigate left bank (Map.1.2).

Badin district is mostly covered by Fuleli and Akram Wah; with a command area of 9.29 and 4.87 lakh acres respectively. A network of 75 minors and distributaries of Fuleli and 48 of Akram Wah covers the total command area, thus creating a network of canals around Badin and Jati towns (Map.1.3).

Similarly all the agricultural drainage water – surface and ground water of the whole Sindh province is brought to the Arabian Sea via Badin district through a network of surface drains. The Spinal drain is bifurcated into DPOD and KPOD. DPOD drains into Shakoor dhandh whose 25% is in Pakistan and 75% in India and has a natural gradient

flowing into the dhandh. KPOD as it flows down into Sumando creek is named as Tidal Link as it enters the tidal plain before ending into the creek and passes through Chorli Dhand (Map 1.4).

The length of DPOD is about 30 miles (Map 1.4) and follows a natural gradient, however it has been blocked by constructing a wall across the drain to avoid potential pollution of Shakoor Dhand which partly belongs to India. Consequently the flow now is diverted to KPOD and then through Tidal Link into Samando Creek in Arabian Sea. Tidal link is the continuing portion of KPOD which passes through tidal areas just upstream of the creek (Map.1.4). In addition to KPOD and DPOD located at 25 to 30 Km east and south of Badin town, there are a number of sub-drains on right and left of Badin town. They are West KPOD, East KPOD, Lowari Branch surface drainage system and in the south Ahmed Raju surface drain. Thus it will be seen that Badin and adjacent districts have a number of small and big canals and criss-crossed by a large number of surface drains.

Badin and adjoining areas are now prone to greater risk due to high tide flooding entering the Tidal Link whose bed level at Samondo Creek is 16 ft below the sea level and no regulator gates provided to check the inflow of sea water into the link. Following should be kept in mind for any future remedial measures:

i) The natural flow of the spinal drain is through DPOD into Shakoor dhand, which is blocked. While the entire drainage is through KPOD which flows into Samando Creek (Arabian Sea). KPOD passes through Chorli dhand for which a Chorli Weir was built which has collapsed. The tidal link is subjected to reverse flow twice every day due to tidal fluctuation, whose affects can be observed upto even sub-drains around Badin i.e. West & East KPOD, Ahmed Raju, Lowari. The situation becomes more severe with higher tides due to cyclones allowing the Arabian Sea into Badin and adjoining districts.

ii) The cross-section at prism of the Tidal Link which passes through Chorli Dhand got badly damaged most of its banks were washed away. The Chorli weir which was constructed along the right bank of the Tidal Link to separate the link from Chorli Dhand (Map.1.4), collapsed thus merging the sweet water dhand with the link.

Remaining banks of Tidal Link were washed away by the cyclonic storms of 1999 and now the LBOD system almost ends up with KPOD while Tidal Link portion has more or less vanished.

It was observed during the field visit that the sub-drains in Badin district, which were recently completed (2002 to 2004) have also suffered damage due to reverse flow from the Arabian Sea.

1.8. Main Causes Of Inundation Of Badin

There are a number of factors which have contributed in flooding of the Badin district and its main towns. There are three typical case studies of flooding (1995, 1999, 2003), which helped to analyse the major causes for the flooding and resulting devastation.

Rainfall: Badin receives an average rainfall 80 mm, while in July 2003, according to Meteorological data, a ten year record was broken in Sindh when 292 mm of rain was recorded in 24 hours while in the worst effected district of Badin the intensity of rainfall storm had reached a value 12 mm per hour. Since it is a flat plain with 1:10,000 to 1:12000 gradient, the retention time of the surface runoff is high and particularly the low lying areas get flooded and filled up water keeps standing for almost 7 to 10 days. Such rain storms normally occur during the monsoon season when the Arabian Sea is also rough and tides are high.

Canal System: As mentioned above, there is a network of big and small canals in Badin in the Kotri barrage left bank command area. At times of high intensity rainfall in the area, cultivators stop taking their share of irrigation supplies, which continue to flow down stream and when the discharge exceeds the canal capacity, then,

i) the canal escapes operate and flood the drains
ii) water level exceeds the free board and over tops the canal bank
iii) weaker sections breach and flood the area.

Thus there is already flooding due to rainfall and the breached or overflowing canals add to the flood.

Head Regulator Control at Kotri Barrage: In a situation when it has rained in the surrounding areas, of the barrage, there are standing instructions to lower the canal gauge by one foot immediately. Further reduction is done on the specific instructions from SIDA officials who control the left bank canals and command area. This information can be passed on telephone and therefore there is no time lag as far as passing of instruction is concerned to the control room at Kotri barrage.

However for the safety of canal banks against sudden draw down, the water level in the canal is reduced at 0.25 ft per hour. It takes at least 10 to 12 hours before the closure impact reaches the affected areas and that too at a slow rate of 0.25 ft/hour.

Drainage System: Another important factor that has contributed to the flood damage is the drainage system itself. The drainage efficiency has been greatly reduced by blocking DPOD, the natural way to drain the area, and then forcing the drainage water through KPOD and then into Tidal Link which ends up 16 ft. below the sea level. Arabian Sea which before construction of Tidal Link used to be 20 to 40 Km from Badin has now been given almost a free approach into the Badin district. It was observed during the field trip that all the sub-drains i.e. West & East KPOD, Ahmed Raju, Lowari etc. flow upstream twice a day with the rise in tide in Arabian Sea. The condition is worst in monsoon when sea is high and still worst if there occurs a tidal bore. It enters and submerges vast areas in Badin.

The second way in which drains have caused inundation of Badin district is vandalism due to which drainage system flooded the downstream areas. The drainage system due to engineering constraints and economy has been designed for a retention period of 7 days for surface runoff.
As per this design criteria a number of inlets have been provided through which runoff enters the drains in which case drains flow at designed level with an allowance of freeboard between the top of the bank and maximum water level.

However the survey showed that during 2003 rains, the cultivators from Nawabshah to Badin (about 100 Km length of Spinal drain) made 396 cuts direct into the main channel (spinal drain) to accelerate the exit of the standing water from their fields. This did help few farmers located in the upstream reaches but due to this sudden rise in discharge all the drains overflowed and in some cases breached the spoil banks and flooded the downstream areas like Badin district.

Plugging of 396 cuts by itself is a project and may take some time. However if this practice is not stopped the drainage system would play havoc with the lower riparians particularly when rains also occur in the same time frame.

Tidal Bore: A tidal bore due to cyclonic action (1999) entered coastal belts flooding vast areas and contributed its share to devastation

To sum up if all the above factors synchronize then severe damages are likely to occur in agriculture and urban sectors of Badin district.

1.9. Remedial Measures in Progress

Government Agencies now are involved and mitigation measures are under implementation.

The Phase-I is to reduce the height of the blocking wall built across DPOD by 2.5 ft. meanwhile construct downstream of the wall a regulator with automatic gates which would open when the level upstream rises to the predetermined level.

In Phase-II once the regulator is complete the blocking wall will be removed. This would ensure a partial flow into Shakoor dhand whereas major flow component will still flow through KPOD into Arabian Sea.

1.10. Proposed Management Plan

i). It may be inferred that forcing the drainage effluent through KPOD & Tidal link into Samando Creek is not in consonant with natural flow conditions. Chorli dhand and Tidal Link have merged into each other. The Arabian Sea has linked up with Chorli dhand and the flow downstream the Dhand is not as per design. Therefore feasibility of utilizing DPOD in place of KPOD should be examined.

ii). A weir is proposed across the KPOD to check sea intrusion into Badin district. This may partially abandone the KPOD & Tidal Link. However it would serve the objective to protect Badin against high tides, and reverse flow.

iii). At present there are 396 cuts into spinal drain of LBOD system and urgent steps be taken to plug these cuts. It should be ensured for future that no illegal cuts are made in the main and sub-drains. The laws are universal and any breach of law has serious consequences. Just as direct connections can not be allowed from 440 KV or 1100 KV main lines or a direct outlet from a main canal is not only illegal but would ruin the system, similarly a direct cut into the main drain can not be allowed. The 396 cuts have harmed the system and ultimately would destroy it totally.

These are many issues involved interacting and it is recommended to have separate in detail study done.

iv). Control of canal system can be further improved. The control room at Kotri barrage immediately lowers by 1 ft. the canal gauge if there is rain in the vicinity of the barrage. It acts according to the instructions received from the command areas which now are under control of SIDA.
The gate closure and lowering of gauge (i.e. water level) is very slow and it takes some time before the impact reaches the affected area and by this time the damage is done.

Therefore the SIDA staff must be in close touch with Meteorological Department and take decisions in anticipation of rainfall so as not to allow any possibility of synchronization between canal spillover or breach, rainfall, over flowing drains, and tidal bore.

Meteorological department forecasts are quite reliable, and appropriate decision for lowering of canals based on weather forecast taken by concerned SIDA staff in the area can help reduce the intensity and magnitude of damage.

v). Badin city is just 14 ft. above MSL while the general contours in the district varies between 13 ft. to 21 ft. above MSL.

If cost is no concern for saving human life and damage to urban property, then the best protection for Badin will be an earthen dyke around the city with stone pitching on both sides of the embankment slope. A ring road on the dyke will be an additional facility to serve as by pass for the highway now passing through Badin. For this purpose detailed engineering feasibility, survey and design would be required.

1.11. Conclusions & Recommendations

1.11.1. Conclusions

- Badin district and its cities and towns are under permanent threat of inundation due to its low ground levels & closeness to the sea.

- The canal with their escapes are located in the district being the tail end of the irrigation system of Indus. Similarly all the drainage water from upper Sindh downwards has to pass through Badin, adding to the miseries created by a heavy rainfall.
- The year 2003 inundation was unprecedented caused by all the above factor worked in resonance and created an unprecedented peak of flooding. The year 1995 inundation was little less since the ocean tide could not reach Badin because then Tidal link was not constructed.

1.11.2. Recommendations

- Complete dismantling of weir wall at DPOD on completion of automatic regulator.

- A weir across KPOD to check sea intrusion (its design to be decided based on feasibility report).
- Making good the illegal (396 Nos.) cuts made in spinal drain.
- To control the canal water system a close cheek spellings between SIDA and Meteorological Department to enable lowering of head regulator gates in case of rain.
- SCADA (Supervisory, Control and Data Acquisition) System and telecommunication (optic fibre) between SIDA officials at Badin and Control Room at Kotri Barrage needs to be established.
- Detailed engineering feasibility and design for construction of a protective dyke wall with other infrastructure to protect Badin city from tidal waters and tidal bore as well as provision for disposal of surplus canal, drain, and rain waters outside dyke during excessive rains should be carried out. The construction of a ring road over the proposed dyke may create opportunity to levey a road tax whose will partly share the cost of the ring road and the dyke.

APPENDIX - "B": GENERAL HEALTH PROBLEM ACROSS REGIONS

(Based on the Information Collected through Household Survey)

TABLE – B.1
GENERAL HEALTH PROBLEM ACROSS REGIONS

(Row percentage)

Health Problems	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No apparent problem	4	50	25	–	25
Malaria	72	58	18	14	8
Malaria + Cough	35	11	40	23	26
Malaria + T.B. + Hepatitis	4	75	25	–	–
Women related	1	–	100	–	–
Skin diseases/Itching	2	–	40	–	50
Could not explain	13	–	–	150	50
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

TABLE – B.2
WATER RELATED HEALTH PROBLEMS ACROSS REGIONS

(Row percentage)

Health Problems	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No apparent problem	21	52	33	14	–
Malaria	27	44	18	11	26
Malaria + Stomach Problem	62	37	27	18	18
Hepatitis + Stomach	8	62	25	12	–
Could not explain	3	–	–	150	50
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

The severity of the health related problems abundantly shows that the problem is largely related to water and its management. The reported incidences of sickness due to water related factors were also verified during FGD's.

TABLE – B.3
MEDICAL EXPENSES PER MONTH ACROSS REGIONS

(Row percentage)

Level of Expenditure	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Not Relevant / Don't Know	1	–	–	–	100
Upto Rs.100 / month	18	44	39	–	17
Rs.100 to Rs.500 / month	58	40	33	17	10
Rs.500 to Rs.1000 / month	31	39	16	19	26
Over Rs.1000 / month	13	61	–	31	8
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

Table 9 provides information on the pattern of medical expenses incurred across various categories of medical expenditure.

8.1.1. Current Sources of Drinking Water

Table 8.10 provides information the current sources of drinking water by the respondents. A vast majority (66%) receives water from hand pumps followed by 20 percent who use canal water. Another 8 percent receive water through pipes. There were no reporting of water supplies through tankers in rural areas. However, in urban areas (e.g. Mirpurkhas) where during FGD's presence of tankers was reported. The reported level of cropping intensities in the sample are does not suggest that the recharge from the canals could be so low to affect hand pumps water supplies.

TABLE – B.4
CURRENT SOURCE OF DRINKING WATER ACROSS REGIONS

(Row percentage)

Sources	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No response	1	–	–	–	100
Hand pump	80	42	29	12	16
Canal	24	29	25	37	8
Piped water supply	10	80	–	–	20
Well	4	50	50	–	–
Tubewell	2	–	–	50	50
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

TABLE – B.5
EARLIER SOURCE OF DRINKING WATER ACROSS REGIONS

(Row percentage)

Sources	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Hand pump	53	45	24	11	19
Canal	58	40	24	24	12
Piped supply	3	67	–	–	33
Well	6	33	67	–	–
Tubewell	1	–	–	–	100
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

TABLE – B.6
DISTANCE TO SOURCE (KM) ACROSS REGIONS

(Row percentage)

Distance	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No distance	99	41	26	13	19
1	20	40	25	35	–
5	1	100	–	–	–
50	1	100	–	–	–
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

TABLE – B.7
DID REHABILITATION CAUSE ANY CHANGE IN FETCHING WATER ACROSS REGIONS

(Row percentage)

Yes / No	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
No	121	42	26	16	17
Total	**121**	**51**	**31**	**20**	**19**

Source: Household survey data collected under the study.

TABLE – B.8
ANY QUALITATIVE CHANGE IN WATER SUPPLIES ACROSS REGIONS

(Row percentage)

Yes / No	Total # Farms Reporting	Nara	Left Bank	Right Bank	Ghotki
Yes	31	52	23	16	10
No	90	39	27	17	18
Total	**121**				

Source: Household survey data collected under the study.

TABLE –B.9

PERCENTAGE DISTRIBUTION OF FARMS AND FARM AREA ACROSS DIFFERENT FAR SIZE AND TENURIAL CATEGORIES IN SINDH AND SELECTED DISTRICTS

(Percentage)

	Sindh		Sukkur Distt.		Sanghar Distt.		Mirpurkhas Distt.		Hyderabad Distt.		Thatta Distt.	
	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area
Farm size categories (under 5 acres)	46	12	40	14	50	20	46	10	46	14	33	08
(5–12.5)	36	28	49	51	39	25	30	18	37	26	41	25
(12.5–25)	10	16	07	16	07	15	11	15	10	16	13	17
(25–50)	05	18	03	12	03	13	09	23	04	14	09	21
(50 and above)	03	26	01	07	01	18	05	34	04	32	04	39
	Sindh		Sukkur Distt.		Sanghar Distt.		Mirpurkhas Distt.		Hyderabad Distt.		Thatta Distt.	
	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area	% of Farms	% of Farm Area
Owner	66	76	62	60	33	53	59	74	52	70	94	93
Owner-cum-Tenant	04	07	28	30	01	02	02	16	02	06	03	04
Tenant	30	17	11	10	66	45	39	10	48	24	04	03

Source: Census of Agriculture, Sindh, Vol.II, 2000.

DESCRIPTIVE INFORMATION ON FARM HOUSEHOLDS SAMPLED UNDER ISEA

TABLE – B.10
BY FARM SIZE BY TENURE

(# Farms)

Farm Size Categories	Tenurial Status			
	Owners	Owner-cum-Tenant	Tenants	Total
1. Very Small (under 5 acres)	09	–	15	24
2. Small Farms (5 to 16 acres	43	02	10	25
3. Medium Size Farms (16 to 50 acres)	28	01	–	29
4. Large Size Farms (Above 50 acres)	11	02	–	13
TOTAL	**91**	**05**	**25**	**121**

Source: ISEA Field Data, 2005.

TABLE – B.11
BY FARM SIZE BY REGION

(# Farms)

Farm Size Categories	Regions				
	Nara	Left Bank	Right Bank	Ghotki	Total
1. Very Small (under 5 acres)	12	06	02	04	24
2. Small Farms (5 to 16 acres	20	16	11	08	55
3. Medium Size Farms (16 to 50 acres)	09	09	04	07	29
4. Large Size Farms (Above 50 acres)	10	–	03	–	13
TOTAL	**51**	**31**	**20**	**19**	**121**

Source: ISEA Field Data, 2005.

TABLE – B.12
BY LOCATION FACTORS

(# Farms)

Location of Watercourse on Channel	Location of Farm Within Watercourse			
	Head	Middle	Tail	Total
1. Head	22	08	01	31
2. Middle	26	14	03	43
3. Tail	28	09	10	47
TOTAL	**76**	**31**	**14**	**121**

Source: ISEA Field Data, 2005.

TABLE – B.13
AVAILABILITY OF WATER PER ACRE BY FARM SIZE BY TENANCY

(Hours/acre)

Farm Size	TENANCY			TOTAL
	Owner	Owner-cum-Tenant	Tenant	
Very Small	0.47 (5)	–	1.21 (13)	1.01 (18)
Small	0.93 (29)	–	0.46 (7)	0.84 (36)
Medium	0.54 (20)	–	–	0.54 (20)
Large	0.47 (9)	0.40 (2)	–	0.46 (11)
Total	**0.70 (63)**	**0.40 (2)**	**0.95 (20)**	**(85)**

Source: Household data collected under the study, 2004
Note: Figures in parenthesis show # households.

Table – B.14
Availability of Water Per Acre by Farm Size by Region

(Hours/acre)

FARM SIZE	REGION				TOTAL
	Nara	Left Bank	Right Bank	Ghotki	
Very Small	1.23 (12)	1.00 (1)	0.50 (2)	0.46 (3)	1.01 (18)
Small	0.73 (19)	1.35 (2)	1.37 (7)	0.49 (8)	0.84 (36)
Medium	0.58 (10)	0.33 (6)	0.80 (2)	0.75 (2)	0.54 (20)
Large	0.46 (10)	–	0.43 (1)	–	0.46 (11)
Total	**0.77 (51)**	**0.63 (9)**	**1.05 (12)**	**0.52 (13)**	**0.75 (85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households. The total of 85 farms represents landowners only because of the computation of the variable on availability. It thus excludes tenants and those owners who had sharecropped/rented out their land.

TABLE – B.15
AVAILABILITY OF WATER PER ACRE BY FARM SIZE BY FARM LOCATION ON WATERCOURSE

(Hours/acre)

Farm Size	FARM LOCATION ON WATERCOURSE			TOTAL
	Head	Middle	Tail	
Very Small	1.07 (13)	0.72 (4)	1.33 (1)	1.01 (18)
Small	0.88 (18)	0.72 (15)	1.15 (3)	0.84 (36)
Medium	0.57 (16)	0.42 (4)	–	0.54 (20)
Large	0.44 (6)	0.40 (1)	0.50 (4)	0.46 (11)
Total	**0.79** **(53)**	**0.65** **(24)**	**0.85** **(8)**	**0.75** **(85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

TABLE – B.16
AVAILABILITY OF WATER PER ACRE BY FARM SIZE BY WATERCOURSE LOCATION ON CHANNEL

(Hours/acre)

FARM SIZE	WATERCOURSE LOCATION ON CHANNEL			TOTAL
	Head	Middle	Tail	
Very Small	0.61 (7)	2.17 (3)	0.92 (8)	1.01 (18)
Small	0.74 (8)	0.78 (13)	0.93 (15)	0.84 (36)
Medium	0.34 (2)	0.60 (12)	0.49 (6)	0.54 (20)
Large	0.54 (2)	0.44 (2)	0.44 (7)	0.46 (11)
Total	**0.63** **(19)**	**0.83** **(30)**	**0.76** **(36)**	**0.75** **(85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

TABLE – B.17
LEVEL OF CROPPING INTENSITY BY FARM SIZE BY TENANCY

(Percentage)

FARM SIZE	TENURE			TOTAL
	Owner	Owner-cum-Tenant	Tenant	
Very Small	180 (5)	–	177 (13)	178 (18)
Small	165 (29)	–	187 (7)	169 (36)
Medium	141 (20)	–	–	141 (20)
Large	158 (9)	158 (2)	–	158 (11)
Total	**158** **(63)**	**158** **(2)**	**180** **(2)**	**163** **(85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

Table – B.18
Level of Cropping Intensity by Farm Size by Region

(Percentage)

FARM SIZE	REGION				TOTAL
	Nara	Left Bank	Right Bank	Ghotki	
Very Small	177 (12)	175 (1)	200 (2)	167 (3)	178 (18)
Small	169 (19)	188 (2)	174 (7)	161 (8)	169 (36)
Medium	143 (10)	10 (6)	190 (2)	185 (2)	141 (20)
Large	159 (10)	–	147 (1)	–	158 (11)
Total	**164** **(51)**	**133** **(9)**	**179** **(12)**	**166** **(13)**	**163** **(85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

TABLE – B.19
LEVEL OF CROPPING INTENSITY BY FARM SIZE BY FARM LOCATION ON WATERCOURSE

(Percentage)

Farm Size	FARM LOCATION ON WATERCOURSE			TOTAL
	Head	Middle	Tail	
Very Small	182(13)	158 (4)	200 (1)	178 (18)
Small	163 (18)	173 (15)	182 (3)	169 (36)
Medium	138 (16)	154 4)	–	141 (20)
Large	163 (6)	140 (1)	155 (4)	158 (11)
Total	**160 (53)**	**166 (24)**	**171 (8)**	**163 (85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

TABLE – B.20
LEVEL OF CROPING INTENSITY BY FARM SIZE BY WATERCOURSE LOCATION ON CHANNEL

(Percentage)

FARM SIZE	WATERCOURSES LOCATION			TOTAL
	Head	Middle	Tail	
Very Small	180 (7)	172 (3)	178 (8)	178 (18)
Small	176 (8)	173 (13)	162 (15)	169 (36)
Medium	98 (2)	151 (12)	136 (6)	141 (20)
Large	189 (2)	128 (2)	158 (7)	158 (11)
Total	**170 (19)**	**161 (30)**	**160 (36)**	**163 (85)**

Source: Household data collected under the study 2004
Note: Figures in parenthesis show # households.

TABLE – B.21
PER CAPITA TOTAL ANNUAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY REGION

(Rupees)

FARM SIZE	REGION*								TOTAL	
	Nara		Left Bank		Right Bank		Ghotki			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,915 (11)	9,393 (1)	5,378 (6)	–	–	1,221 (2)	4,403 (1)	15,055 (3)	5,041 (18)	13,163 (6)

Small (5–16 acres)	5,824 (7)	19,528 (13)	6,515 (6)	14,303 (10)	4,109 (3)	26,689 (8)	7,099 (4)	36,569 (4)	6,029 (20)	21,619 (35)
Medium (16–50 acres)	6,038 (1)	31,424 (8)	6,453 (2)	40,423 (7)	–	19,968 (4)	–	22,896 (7)	6,315 (3)	29,789 (26)
Large (Above 50 acres)	2,818 (1)	65,889 (9)	–	–	–	55,287 (3)	–	–	2,818 (1)	63,239 (12)
Total	**5,418 (20)**	**35,731 (31)**	**6,019 (14)**	**25,058 (17)**	**4,109 (3)**	**28,451 (17)**	**6,560 (5)**	**25,123 (14)**	**5,549 (42)**	**29,988 (79)**

* Regions reflect Area Water Boards (AWB) of Nara, Left Bank and Ghotki under SWIP. The Right Bank represents control group.

Source: ISEA Survey Data, 2004.

TABLE – B.22
PER CAPITA TOTAL ANNUAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY FARM LOCATION ON WATERCOURSE

(Rupees)

FARM SIZE	FARM LOCATION						TOTAL	
	Head		Middle		Tail			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	5,420 (11)	12,164 (5)	3,825 (5)	18,160 (1)	5,996 (2)	–	5,041 (18)	13,163 (6)
Small (5–16 acres)	6,390 (12)	22,800 (18)	5,073 (7)	17,826 (14)	8,387 (1)	32,238 (3)	6,029 (20)	21,619 (35)
Medium (16–50 acres)	5,774 (2)	30,346 (21)	–	27,734 (3)	7,397 (1)	27,020 (2)	6,315 (3)	29,789 (26)
Large (Above 50 acres)	–	85,369 (7)	–	10,838 (1)	2,818 (1)	37,612 (4)	2,818 (1)	36,239 (12)
Total	**5,914 (25)**	**33,452 (51)**	**4,553 (12)**	**19,040 (19)**	**6,119 (5)**	**33,467 (9)**	**5,549 (42)**	**29,988 (79)**

Source: ISEA Survey Data, 2004.

TABLE – B.23
PER CAPITA TOTAL ANNUAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY WATERCOURSE LOCATION ON CHANNEL

(Rupees)

FARM SIZE	WATERCOURSE LOCATION						TOTAL	
	Head		Middle		Tail			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,861 (7)	10,176 (3)	5,451 (4)	17,612 (1)	4,986 (7)	15,420 (2)	5,041 (18)	13,163 (6)
Small (5–16 acres)	6,320 (6)	17,628 (9)	6,021 (5)	20,241 (16)	5,840 (9)	27,416 (10)	6,029 (20)	21,619 (35)
Medium (16–50 acres)	–	24,462 (3)	7,397 (1)	30,227 (14)	5,774 (2)	30,216 (9)	6,315 (3)	29,789 (26)
Large (Above 50 acres)	–	43,097 (3)	–	175,439 (2)	2,818 (1)	39,814 (7)	2,818 (1)	63,239 (12)
Total	**5,534 (13)**	**22,103 (18)**	**5,931 (10)**	**33,804 (33)**	**5,359 (19)**	**30,559 (28)**	**5,549 (42)**	**29,988 (79)**

Source: ISEA Survey Data, 2004.

TABLE – B.24
PER CAPITA ANNUAL AGRICULTURAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY TENANCY

(Rupees)

FARM SIZE	TENANCY						TOTAL	
	Owner		Owner-cum-Tenant		Tenant			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,104 (8)	9,393 (1)	–	–	4,368 (14)	9,393 (1)	4,272 (22)	9,393 (2)
Small (5–16 acres)	4,877 (21)	21,538 (22)	1,174 (1)	1,741 (1)	4,639 (6)	12,023 (4)	4,694 (28)	19,766 (27)
Medium (16–50 acres)	4,426 (5)	27,335 (23)	–	18,786 (1)	–	–	4,426 (5)	26,979 (24)
Large (Above 50 acres)	3,757 (2)	68,033 (9)	–	14,031 (2)	–	–	3,748 (2)	58,214 (11)
Total	**4,580 (36)**	**31,350 (55)**	**1,174 (1)**	**14,647 (4)**	**4449 (20)**	**11,497 (5)**	**4,475 (57)**	**28,755 (64)**

Source: ISEA Survey Data, 2004.

TABLE – B.25
PER CAPITA ANNUAL AGRICULTURAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY REGION

(Rupees)

FARM SIZE	REGION								TOTAL	
	Nara		Left Bank		Right Bank		Ghotki			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,193 (11)	9,393 (1)	4,725 (6)	–	3,053 (2)	–	4,468 (3)	9,393 (1)	4,272 (22)	9,393 (2)
Small (5–16 acres)	4,780 (11)	17,378 (9)	5,172 (8)	13,155 (8)	4,366 (4)	21,907 (7)	3,998 (5)	39,562 (3)	4,694 (28)	19,766 (27)
Medium (16–50 acres)	6,038 (1)	24,508 (8)	6,184 (2)	35,108 (7)	4,862 (2)	27,397 (2)	–	21,555 (7)	4,426 (5)	26,979 (24)
Large (Above 50 acres)	2,818 (1)	57,158 (9)	–	–	4,697 (1)	62,965 (2)	–	–	3,757 (2)	58,214 (11)
Total	**4,482 (24)**	**32,455 (27)**	**4,756 (16)**	**23,399 (15)**	**4,221 (9)**	**30,370 (11)**	**4,175 (8)**	**25,360 (11)**	**4,475 (57)**	**28,755 (64)**

Source: ISEA Survey Data, 2004.

TABLE – B.26
PER CAPITA ANNUAL AGRICULTURAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY FARM LOCATION ON WATERCOURSE

(Rupees)

FARM SIZE	FARM LOCATION						TOTAL	
	Head		Middle		Tail			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,267 (14)	9,393 (2)	3,709 (6)	–	5,996 (2)	–	4,272 (22)	9,393 (2)
Small (5–16 acres)	4,363 (14)	20,818 (16)	4,766 (13)	15,451 (8)	8,387 (1)	25,663 (3)	4,694 (28)	19,766 (27)
Medium (16–50 acres)	3,026 (3)	27,605 (20)	–	18,754 (3)	6,525 (2)	39,138 (1)	4,426 (5)	26,979 (24)
Large (Above 50 acres)	–	81,309 (7)	–	10,838 (1)	3,757 (2)	20,117 (3)	3,757 (2)	58,214 (11)
Total	4,190 (31)	32,736 (45)	4,432 (19)	15,892 (12)	5,849 (7)	25,211 (7)	4,475 (57)	28,755 (64)

Source: ISEA Survey Data, 2004.

TABLE – B.27
PER CAPITA ANNUAL AGRICULTURAL INCOME OF FARMS BELOW & ABOVE POVERTY LINE BY FARM SIZE BY WATERCOURSE LOCATION ON CHANNEL

(Rupees)

FARM SIZE	WATERCOURSE LOCATION						TOTAL	
	Head		Middle		Tail			
	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty	Below Poverty	Above Poverty
Very Small (Under 5 acres)	4,488 (8)	9,393 (2)	5,535 (5)	–	3,378 (9)	–	4,272 (22)	9,393 (2)
Small (5–16 acres)	4,515 (8)	16,319 (7)	4,640 (11)	17,205 (10)	4,917 (9)	24,739 (10)	4,694 (28)	19,766 (27)
Medium (16–50 acres)	–	16,323 (3)	4,311 (3)	28,368 (12)	4,148 (2)	28,678 (9)	4,426 (5)	26,979 (24)
Large (Above 50 acres)	–	34,848 (3)	–	173,605 (2)	3,757 (2)	31,434 (6)	3,757 (2)	58,214 (11)
Total	4,502 (16)	19,102 (15)	4,871 (19)	35,820 (24)	4,112 (22)	27,764 (25)	4,475 (57)	28,755 (64)

Source: ISEA Survey Data, 2004.

TABLE – B.28
INCOME RATIO BETWEEN FARMS BELOW AND ABOVE POVERTY LINE ACROSS DIFFERENT STRATA

$$\text{Ratio of Income} = \left[\frac{\text{Above Poverty Group Averave}}{\text{Below Poverty Group Average}}\right]$$

Income Classification	STRATA				
	Farm Size	Tenure	Region	Farm Location	Watercourse Location
1. Per Capita Total Income:	V. Small = 2.6 Small = 3.6 Medium = 22.4 Large = 22.4 Overall = 5.4	Owner = 5.4 Owner-cum-Tenant = 4.3 Tenant = 2.7 Overall = 5.4	Nara = 6.6 Left Bank = 4.2 Right Bank = 6.9 Ghotki = 3.8 Overall = 5.4	Head = 5.7 Middle = 4.2 Tail = 5.5 Overall = 5.4	Head = 4.0 Middle= 5.7 Tail = 5.7 Overall =5.4
2. Per Capita Farm Income:	V. Small = 2.2 Small = 4.2 Medium = 6.1 Large = 15.5 Overall = 6.4	Owner = 6.8 Owner-cum-Tenant =12.5 Tenant = 2.6 Overall = 6.4	Nara = 7.2 Left Bank = 4.9 Right Bank =7.2 Ghotki = 6.1 Overall = 6.4	Head = 7.8 Middle = 3.6 Tail = 4.3 Overall = 6.4	Head = 4.2 Middle =7.3 Tail = 6.8 Overall= 6.4

Source: Derived from Tables 8.36 to 8.43.
Based on Household Data Collected Under ISEA, 2004.

Chart 8.2

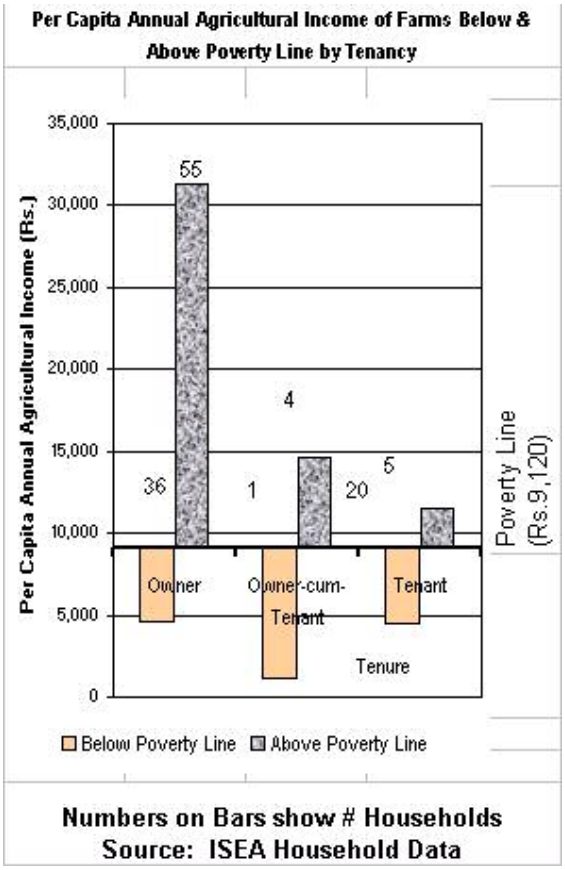


Chart 8.3

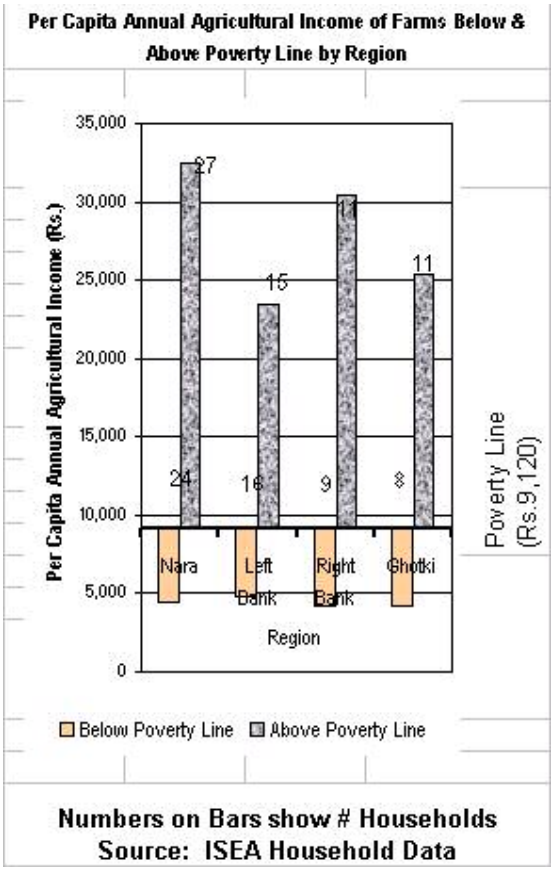


Chart 8.4

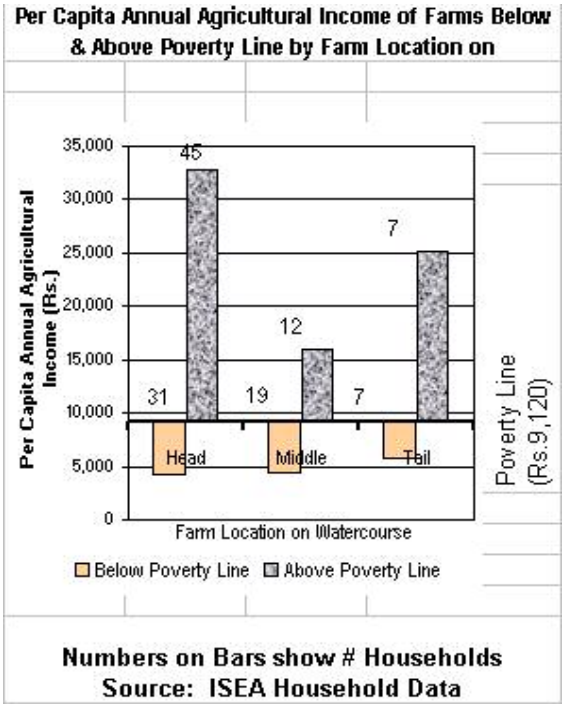
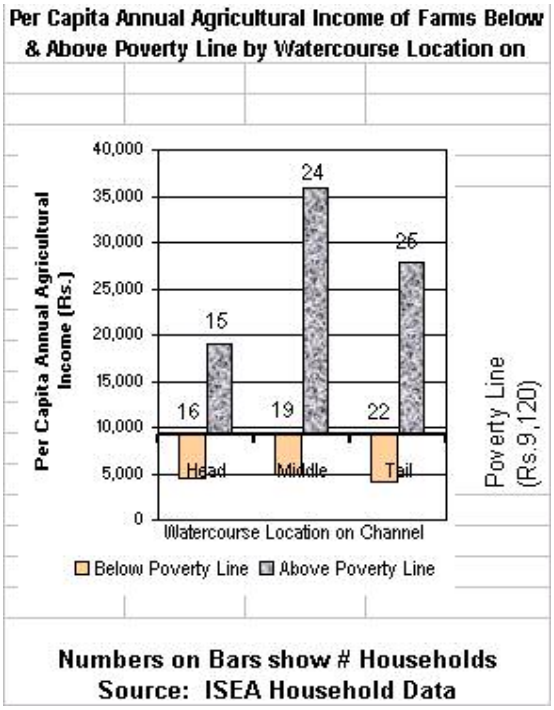


Chart 8.5



APPENDIX – C: PUBLIC CONSULTATIONS

Report on the Consultative Meetings Held at Ghotki, Badin & Mirpurkhas with Representatives of NGO's, Civil Society and other Stakeholders to Disseminate WSIP Phase-I Project Activities and Seek Participants Opinion.

1. PUBLIC CONSULTATIONS

Background

The process of public consultations at the planning and design stages of development programmes does not carry a healthy tradition in developing countries. Generally, development activities are conceived and introduced with little and insignificant public consultation.

In consequence, a significant proportion of development programmes in the past had failed to deliver the intended benefits, mostly on account of design defects and to a lesser extent due to implementation snags. The final outcome of such endeavors distinctly lacks the flavor of ownership from the public. In the obtaining situation the negative externalities arising out of such programmes impose social and environmental costs on the society which are seldom given serious consideration. These in turn create distortions in the form of adverse impacts on livelihood and income of people and environmental degradation (e.g. loss of biodiversity, extinction of a particular species, increased soil salinity, etc.)

The water sector reform of 2002 introduced in Sindh sets a major departure from historical norms under which irrigation system development was earlier conceived. For the first time in the history of the region, some notions of demand orientations were set in place in its irrigation system management whereby the role and autonomy of farmers were enhanced. Though in a way it has only touched the peak of the iceberg, it is nevertheless a right step in the right direction.

The developmental activities envisaged under WSIP (Phase-I) are within the confluence of the water sector reforms of 2002. In the context of the demand orientation reflected in the reform and the preceding discussion on the ignorance towards public consultations, it was considered crucial for this ISEA that the direct beneficiaries (i.e. farmers) and civil society is consulted across different parts of areas constituting WSIP (Phase-I) boundary.

Locations and Frequency of Public Consultations

In the light of above a series of consultative sessions were held with stakeholders. These were held at different locations at different time periods, as per details given below:

Period	Places (Districts)	Mode	Stakeholders	Main Focus
1. Nov. '2004	Ghotki Mirpurkhas Sanghar Thatta	FGD (6 Sessions)	Small Farmers	• Awareness & issues of water management
			Large Farmers	• Awareness & issues of water management
			Women	• Household Factors related to WSIP
			Urban Dweller	• Quality Drilling Water
2. Jan-Mar, '2006	Ghotki Badin Mirpurkhas	Project Disclosure (3 Sessions)	Local Elites Farmers NGO's	Dissemination of information on SIDA & WSIP and discussion on selected issues.
3. Oct. '2006	Ghotki Badin Mirpurkhas	Public Consultation (3 Sessions)	Farmers NGO's/Civil Society, Haris & Ethnic Minority	Consultation on WSIP (Phase-1) & discussion on related issues.

The participants in these meetings largely represented farmers, local NGO's, civil society and other stakeholders. The participants also included females representing NGO's and civil society. The meetings were jointly conducted by SIDA officials and the team leader ISEA.

Participants' Responses

The three sessions of public consultations, held on each of the three occasions (i.e. Nov. 2004, Jan-Mar, 2006 and October 2006), had carried out discussions on the proposed activities under WSIP (Phase-I). This section presents a summary of the main aspects of public responses. The groups of individuals in each of the twelve meetings held so far were distinct i.e. farmers of different size groups, females, civil society members/NGO's representatives/activists and urban dwellers. (Greater details on findings, methodology and participants have been annexed herewith).

In the context of WSIP (Phase-I), SIDA and water sector reforms of 2002, the main groups which had somewhat different perspectives included the following:

a) Farmers
b) civil society/NGO's/Activists
c) urban dwellers (of Mirpurkhas city)
d) Vulnerable Group

a) Farmers

The discussions with farmers largely focused on micro issues of water management. Given the greater uncertainty of irrigation water supplies during the last 5 years or so, it was not surprising that farmers were more interested in ensuring adequate water supplies as an outcome of WSIP or SIDA, and less on the reforms and their enhanced role.

They were, however, vocal over the issue of their representation at FO level and argued for strict adherence to elections (and not nomination or selection which is the local norm) or wanted a rotational system of representation where each size group and locational attributes (i.e. head, middle and tail) are given explicit coverage. The small farmers were more concerned over their true representation at different tiers of SIDA.

With regard to any re-settlement issue arising out of WSIP, they agreed that development work on main or branch canals may cause such controversies and therefore argued that once the detailed design is completed, all potential PAP's must be compensated as per law. They were, however, less sensitive to the environmental consequences and argued that these environmental costs (they had thought those to be of relatively minor nature) would be too little and of temporary nature as compared to the likely benefits of the programme.

b) Civil Society/NGO's/Activists

Though some of the participants of this group of individuals were also land owners, their basic concern was more on the macro level issues like transparency of the system being introduced under the reforms and less on the local level distribution of water to farmers. They frequently referred the outcome of LBOD design defeats, sea intrusion, increased water logging. They also showed their apprehensions over the possible environmental and social issues but were not so keen in pursuing it any further. They, nevertheless, indicated that a more meaningful discussion on the possible environmental and social issues could be carried out once the detailed design of WSIP (Phase-I) is known.

c) Urban Dwellers

Though the discussion with this particular group had largely focused on the water related issues faced by the urban residents, its apprehensions were equally alarming for the rural hinterland. This was particularly so with reference to the quality of drinking water available in the area. They also showed a willingness to pay more to the municipality for the water supplies provided its quality is enhanced. It would perhaps not be irrelevant here to mention that the federal government has made a commitment to provide safe and clean drinking water to all by the year 2007. In this context, the WSIP can play a more supporting role through higher stress on the quality of drinking water. The financial impact of such an intervention may not appear as an issue since the consumers show willingness to pay more.

d) Vulnerable Groups

Another important group of individuals consisting of women, sharecroppers, wage earners and ethnic minority representatives was consulted in separate sessions. In the context of any negative externalities arising out of the project interventions, these groups are likely to be more vulnerable since they have seldom been appraised and consulted at the planning and design stages of development projects.

The women were largely concerned over the likely impact of WSIP on cattle movements and washing bays. They were not interested in the issues of water availability and governance since they have not been effectively involved in water management at the farm or distributary levels from the beginning.

The sharecroppers and wage earners welcomed the proposed project interventions since any possibility of water conservation and/or increased availability is associated with their livelihood. Since these individuals do not own land and thus have no water rights, they were not keen in the institutional development empowering land owners. The sharecroppers, however, showed some interest in becoming members of water users association or Farmers Organization (FO) but were of the view that it is not a possibility in the present environment. The ethnic minority members, who predominantly work as sharecropper or wage labor, were of the view that project activities will not create any negative impact on their well being. Some of the ethnic minority members have overtime acquired land and were of the opinion that the landless face problems in the context of land tenure relationship and access to markets and not necessarily because of being members of ethnic minority.

1.1 Main Findings of Six Focused Group Discussions of Nov-Dec' 2004

1.1.1 Main Observations

- At a time when discussions are carrying out for the subsequent development phases of irrigation water management in Sindh in terms of National Drainage Programme (NDP), its extension and emergence of Sindh Water Improvement Project (WSIP), most of the participants (with the exception of Nara and left bank areas) were found largely ignorant about Water Sector Reforms, establishment of SIDA or its functioning, emergence of Area Water Board and above all their enhanced role and the degree of autonomy accorded to farmers under the reform.

- The general awareness of the people on the subject was largely concentrated over the apparent duality of functions/roles between IPD and SIDA. They do not regard this conflict as part of the transition during which IPD would become part of SIDA at the end. Their apprehension does carry some weight given the non-existence of exemplary traditions of development and sustenance of organisations and institutions in the area. As a consequence people largely focus on day to day events that they think affects them. It would not be irrelevant to argue here that if such images of governance and efficiency with which institutions run today are not reversed, the immediate future may observe people attaching high discount rate to future benefits by narrowly focusing on present (as their dire need) and in the process may accelerate incidence of water theft, over-use of water resources at the cost of destroying their potentials to achieve productivity gains and its sustainability.

- People had shown a complete disassociation with new institutional changes in the water sector and future development works being initiated. They were largely concerned over

non-dependability and erratic variations in the water supplies causing inequities in its distribution.

- It was apparent that the majority of farmers in project area (with the exception of Nara region) and almost all in the control group area (i.e. right bank) had same level of knowledge and views about the system and the institutional changes being introduced for the water sector. Since the implementation of the reforms has so far concentrated in the Nara area, it was obvious that the farmers in that area will have different levels of experience and knowledge over others in this regard.

- The farmers were casting heavy doubts over the reliability of the announcements/promises made by the canal authorities (they largely attribute this to IPD and less to SIDA authorities) for the opening up of specific canal which they had closed apparently to ration out the limited supplies available. The farmers in many sessions advocated the idea to establish local radio stations to regularly disseminate the canal operation plan prepared by the canal authorities. The farmers agreed that such system will create a peer pressure on the authorities to strictly adhere to their schedules for water delivery.

- It was also suggested that in order to increase the effectiveness of the system (which will undoubtedly increase the confidence and respect of farmers for the system) a third party validation may also be enforced to periodically assess the deviations from the announcement of water schedule and report for any judicial actions (if required). As obvious, the use of local radio system (e.g. F.M. channel) can also be extremely effective in disseminating other agriculture-related knowledge and information as practiced in some other developing countries.

- The farmers also agreed to share the cost of partial lining of the irrigation channel on the understanding that it would ensure higher supplies to them through reduced seepage losses.

- On the process of elections at the Farmers Organization (FO) level, the small and medium size farmers showed their concerns. They were of the view that it is not an election process. Rather it reflects selection made by few or nomination conducted in such social environment where the less privileged ones have no courage or social bondage to confront. This process hints towards a tradition where non-transparency becomes a forced option. A suggestion was also made to make it mandatory for an office bearer who want to contest or is being nominated for the third time in office to acquire at least two-thirds majority votes at FO level.

1.1.2 Non-Agricultural Use Of Water

- The participants strongly criticised the water supplies made to Mirpurkhas city for the use of residents and industrialists/businessmen.

- The following specific points were indicated by the participants:

  i) The water supplies made to the city are not treated.

  ii) Every fifth person in the city is suffering from hepatitis A, B or C.

  iii) Contamination of water supplies with sewage water is common.

  iv) The water is supplied from Jamrao Canal through tanks which are not regularly cleaned and carry heavy silt.

v) The water through boring of well is sold by local municipality at a rate of Rs.200 per tanker or Rs.30 per drum.

vi) Water is apparently available in plentiful quality but its quality is extremely poor.

vii) Market for mineral water has increased several folds during the last 10 years or so. A supplier, who was among participants, revealed that currently nearly 600 trucks supply branded mineral water each month as compared to 20 to 25 cartons per month 10 years ago.

- The participants suggested the following measures:

i) Water supply system be privatized.

ii) People are willing to pay a higher price if the quality of water improves (Currently only 30 percent pay water tax to municipality which is less than Rs.100 per household per month).

1.2 Main Findings of Three Consultative Workshops of Jan-Mar' 2006

1.2.1 Description of the workshops

3 Awareness Workshops i.e. one in each AWB,have been held. First workshop was held at Ghotki, headquarter of Ghotki Feeder Canal Area Water Board (GFCAWB) on 19th January, 2006. The second one was held at Badin, headquarter of Left Bank Canals Area Water Board (LBCAWB) on 25th January, 2006, while third Awareness Workshop was held at Mirpurkhas, the headquarter of Nara Canal Area Water Board (NCAWB) on 29th March, 2006. All these awareness workshops were participated by a large number of the representatives of respective AWBs, FOCs and FOs as well as prominent farmers of the area plus the representatives of NGOs, journalist community and other sections of civil society.

The response of the participants was very positive. Most of them welcomed the announcement that soon a new package of irrigation reforms in the form of WSIP was being introduced by Sindh Government with the assistance of World Bank. They also appreciated the policy of seeking views of the stake holders about the programme before its implementation. However, during the consultation process, following issues and concerns were raised by the various participants. The participants were informed about the response and how the WSIP project addresses these issues in design and during implementation:

#	Issues/Concern	Project Response
A	FO Organization and Management	
1	The feudal and influential would dominate FOs and control the water under reforms programme.	The project supports FOs which would only be formed through a democratic process and represents more than 67% of the landowners followed by the command area. This has been clearly mentioned in the Legal framework. At least half of the representation in Board of Management of tail/small farmers is mandatory, otherwise FO may not be able to acquire legal status.
2	Involvement of NGOs in Social mobilization and FO formation process may also be sought	The project encourages the involvement of NGOs in social mobilization, awareness, training and community support services that are to be offered by the project. The executing agency is also willing to outsource such activities to interested and qualified NGOs and institutes.
3	Canal and branches may be lined before the lining of watercourses	The project would carry out complete rehabilitation and modernization of channels in the AWB command area. During implementation process, the project manager and consultants would take care of the system in a way it may covers whole irrigation system of canal including minors. Lining of canals is not feasible investment under this project.
4	Political will should be demonstrated to implement the WSIP	The GoS is fully committed with the reforms and has established SIDA. The project supports the establishment of Chairman SIDA (also Minister IPD) Secretariat which would ensure to generate political support. The GoS has already agreed and assured continuity of reforms.
5	WSIP awareness workshops be held in the length and breadth of the province to inform the farmers fully of all aspects of new WSIP programme in order to seek their feed back in the larger interest of this programme.	The project supports the idea and before and during implementation such workshops are proposed to be held regularly. A FM radio service is also proposed
6	Special attention be given through new WSIP programme for evolving more effective mechanism to completely stop tampering with water course , minors etc.	The project intends to achieve effective, reliable and efficient delivery of water service to small and tail end farmers. The outlets would be repaired under rehabilitation programme and management of canal and minor would be given to AWB and FOs respectively. It is believed that if water users are involved in management, the chances of water theft are reduced.
7	Top management of SIDA is required to give full attention in redressing the problems faced by FOs because FOs are base of the reforms so far introduced and would be focal point of new WSIP programme also.	SIDA being the sole implementer of the project has shown commitment in proper implementation and coordination in the activities. The project design includes steering committee and probably establishment of Regulatory Authority to control quality and ensure proper delivery of service. The MD SIDA and other senior management would made visits in the project area to address the issues of farmers/FO.
8	The people of Badin are at the tail of the province and the country. As such, it was very necessary that SIDA and LBCAWB are supported to the maximum for improving irrigation system.	The project supports improvement of irrigation facilities in Left Bank Canal AWB. This would cover canals and minors. In addition to this various strategic and diagnostic studies would also be carryout to address the issues of irrigation and drainage system located in the Left Bank Canal AWB

1.2.2 Conclusion of the workshop

(i) The participants welcomed WSIP and the policy of seeking views of the stakeholders about the program before its implementation, particularly its environmental impacts and measures for their mitigation and indicated their desire to help in mitigating these effects; even the representatives of NGOs offered their services for making the new program successful.

(ii) Participants expressed their appreciation for the workshop and hoped that the objectives for WSIP would go a long way to make FOs effective in O&M of I&D system and to alleviate rural poverty.

(iii) A member of GFCAWB proposed at Ghotki Workshop to create a system in which it is made mandatory to provide full information to the farmers about the water supplied to them.

(iv) Several participants at Badin Workshop as well as Mirpurkhas Workshop suggested to make necessary amendments in relevant laws, rules & regulations etc. for creating harmony & close cooperation between both the new systems viz. District Government System, Participatory Irrigation Management System, at grass root level i.e. between FOs and Union Councils, to work jointly for making both the systems successful as both the systems are aimed at devolving powers at lowest level.

The workshops were given wide publicity by the National / Local Press. Besides, many TV channels flashed news bulletins and also ran special programs to inform and to disseminate information about the workshops by the Sindh TV Channels i.e. Sindh TV and KTN on January 19th, 20th and 25th 2006.

1.3 Main Findings of Three Consultative Meetings of October 2006

The proceedings were initiated with the introduction of SIDA and ISEA personnels followed by the introduction of each participant. The session was divided in two parts. First an introduction of WSIP (Phase-i) project was made. This included major objectives, process envisaged, likely benefits, performance indicators and project components. A copy of the programme prepared in this report by ISEA is appended. Here the purpose was to disseminate the project and its details to the audience. Second, a list highlighting various issues related with WSIP and SIDA and the resulting questions were put for discussion. Each participant was given sufficient time to discuss the issues. The discussions had to be confined to the specific issues though the participants attempted to bring under discussion those water related issues which are outside the domain of WSIP project. Greater details on the process of conducting these sessions have been provided in Annexures 1 to 3.

1.3.1 General Impression

Since irrigation serves as life blood for rural communities in Sindh and the fact that the irrigation system has rapidly deteriorated in significant proportions over time as a result of negligence shown by the authorities, it was not surprising to observe that they wanted to discuss all major issues related to irrigation water management in Sindh e.g. Kalabagh Dam, Releases below Kotri, LBOD's ineffectiveness. This was despite the fact that the introductory session was entirely devoted to proposed interventions under WSIP.

This macro focus of the participants was, however, diverted to the specifics of WSIP, SIDA and the water sector reforms.

1.3.2 Outcome Of Focused Discussions

During the consultative sessions it was observed that the level of familiarity of the locals about SIDA, AWB and WSIP was very shallow (if not totally absent). This was consistent, though not surprising, with the outcome of the FGD's conducted earlier. In the absence of proper and regular dissemination of related information to the locals, the levels and types of apprehensions often do not carry the facts. This necessitates that the efforts under SIDA to disseminate knowledge to the intended beneficiaries need to be revitalize in order that the level of ownership of the locals over the irrigation water management is established - a necessary condition without which the question of sustainability of any effort in this regard with remain un-answered and is likely to compound the issue. The proposed local radio system (e.g. FM Bank) under this ISEA could be an important instrument in maintaining a close and continued relationship between the system and the beneficiaries.

The participants carefully listened the details on SIDA, the water sector reforms and WSIP (in particular). The appreciated the spirit behind such developmental works but showed concerns over its long term sustainability given the experience of LBOD in Sindh. It was encouraging to note their apprehension over government's huge borrowings for such type of works in the past which failed to sustain. They were concerned over the repayments of such loans that do not provide the intended benefits. This basically reflected their latent desire to be a part of the system functioning which has been lacking historically.

Representation of farming community. There was lots of apprehensions (which was expected) over the issue of representation of the farming community at SIDA and the its different tiers. This aspect also brought under discussion the issue of tail enders who suffer most. They emphasized that unless the tail enders are meaningfully represented, the benefits of the project will not be wide spread and it may further aggravate the situations of rural poverty in Sindh. This aspect of WSIP was considered as the most effective and beneficial for the community.

In response to the questions of institutional effectives in ensuring the success of the project, the implementation aspect was debated at certain length and all agreed that the role of farming community at implementation stage would provide more transparency to the efforts being made.

The participants also discussed the process of their representation at FO and other tiers of the system. The reported that "election" is not the actual process followed. A large number of participants wanted fair and transparent election process. Some were of the view that "nomination" could also be effective under certain conditions. For example, no person can hold a position for more than twice, or a rotational system be evolved whereby the farmers at the head, middle or tail of a distributary / minor are given the opportunities to become F.O president. Since the warabundi system also works on rotations and is familiar in the area, this approach may as well be suited for farmer's representation.

Participation by tenants and women. In all the sessions held, the participants were of the view that tenants and women participation should also be ensured. They argued that all those who own land and / or use irrigation water be represented. In order to distinguish the status of land owners and tenants, it was agreed that a formal association of tenants (not a large scale politically motivated party) be given representation at the F.O level, and women land owners be encouraged to fully participate at the level F.O and other tiers of SIDA.

Indigenous Peoples Issues. Several representatives from *bheel* ethnic minority community also participated in the workshops. With regard to the project's impact on indigenous people (IP's), the

participants were of the view the IP's are part of the system and any change and its effects will fall on them as much it will be on others - implying that there will be no adverse effect which may be specific to IP's only. However, they cautioned that any increase in waterlogging will directly affect the livelihood of IP's in terms of loss of their settlements, assets and threats to their sharecropping arrangements.

Environmental Concerns. In the context of environmental concerns, it was stated that the project may create some issues but those would be of temporary nature and the level of benefits to be derived from the project will be significantly higher than the environmental costs. They further argued that any adverse effort of the project on wetland (if any) will cause hardship / displacement to fishermen as well as will affect the movements of migratory birds. They were of the view that the occurrence (or non-occurrence) of likely environmental efforts could be assessed only at the design stage of the project where it would be extremely relevant to consult the communities.

The participants at Badin showed lots of interest towards the coastal area plan proposed under WSIP. They indicated the possibility of environmental degradation due to intrusion of sea water.

Annexure–1 of Appendix C [Nov-Dec.'2004]

FINDINGS OF FOCUS GROUPS DISCUSSIONS

1.1 Background

The FGD's were conducted as part of ISEA of WSIP at different locations within WSIP target area. The locations within which FGD's were conducted included Ghotki, Left Bank, Nara and Right Bank (taken as control group to assess whether the conditions and water users' perceptions are as any different from the areas comprising WSIP).

A total of six FGD's were conducted by deliberately focusing on a particular group of water users i.e. each participating group was predominantly of small or medium or large farmers. This segregation was considered necessary for a meaningful discussion on the subject without hesitation and fear from any side. Of these six FGD's, one (at Ghotki) was exclusively conducted for women farmers. Another FGD at Mirpurkhas entirely focused on non-agricultural users of canal water. Within each FGD, other stakeholders like local pesticide/fertilizer dealer, local government persons or someone from revenue/irrigation department were also present. The size of each groups was between 8 and 12 persons. The only exception was the one conducted for non-agricultural users of water at Mirpurkhas where 18 persons attended. This was so because there were larger number of stakeholders in the urban location and the venue was the only hotel in the city.

These events were very successful in that these provided a sharper picture of the obtaining situation in the area based on the perceptions and views of the local on the pattern of canal water supplies, their apprehensions over existing performance of the system and their willingness to participate in its future development.

1.2 Administration Of FGD's

All these sessions were held in cordial manners despite heated discussion on the subject over which some participants also kept putting blames over the other participants. Efforts were made to hold the sessions at farms, local teashops or places where farmers frequently meet. During the discussions tea and snacks were served.

In order to keep the discussion focused on specific issues, three project personnel were present throughout who ensured that lengthy and/or irrelevant discussions do not take place and that the participants fully understand the issue and its background. Each session was allocated 90 minutes for the 17 issues, which were either separately or jointly opened for discussion. A list containing 17 issues (sub-section 8.1.5) was exclusively focused during the sessions.

The visit to Badin area, to look into the causes and impact of July 2003 floods, was largely devoted to discussions with local government officials, and visits to the actual sites (some 60 kilometers from Badin near borders with India) where key informants and the direct affectees were gathered who gave first hand information. The schedule and list of all participants of FGD's and Badin are annexed.

1.3 Issues Raised During Focus Group Discussion

i). Good/Bad example of Farmers Organization (F.O.)
ii). Role of F.O.'s in addressing other aspects selected for poverty reduction strategies.
iii). How transparent is the process of election of F.O. members?
iv). What are the main constraints facing effectiveness of D.O.'s?

v). Are there any social taboos in making F.O.'s more effective?
vi). Need to appoint a paid secretary (preferably an agriculture graduate) at F.O. level from outside.
vii). How severe is the impact of direct outlets/lift pumps on the pattern of water availability.
viii). What are the problems related to desilting of distributary/minor?
ix). What are the likely effects of re-alignment of canals/channels?
x). Need for training and institutional development under irrigation sector reform.
xi). How is the collection of abiana maintained at F.O. level?
xii). Resettlement issues, if any, in the context of SWSIP!
xiii). Need for relationship with other agricultural development programmes.
xiv). Non-agriculture use of water and drainage (affluent) and local industries.
xv). Surface and groundwater quality.
xvi). Sea water intrusion.
xvii). How pro-poor is this approach of the government?

1.4 List Of Places Where Focused Group Discussions (FGD's) Were Conducted Under ISEA Of WSIP

i). Right Bank Area (Thatta) small farms
ii). Mirpurkhas (non-agriculture users of water)
iii). Mirpurkhas (with small to medium size farms)
iv). Sanghar (With Large Farms)
v). Tehsil Mirpurkhas (with medium to large farms)
vi). Ghotki (with medium farms)
vii). Badin Visit (Local Officials and Key Informants)

1.5 List Of FGD Participants

i. Goth Ghulam Ali Ather, Tando Muhammad Khan (Autaq Wadera Ali Nazir Rindh)

	Participants	Occupation / Farm Size
i)	Mr. Ghulam Sarwar	25 acres
ii)	Mr. Maroof Ali	05 acres
iii)	Mr. Nawaz Hussain	10 acres
iv)	Mr. Maulana Rafiq	05 acres
v)	Mr. Shahid Bhai	25 acres
vi)	Mr. Sarwar Ali	15 acres
vii)	Mr. Shahnawaz	20 acres
viii)	Mr. Farzand Ali	10 acres
ix)	Mr. Shakoor	05 acres
x)	Mr. Shabbir	04 acres
xi)	Mr. Sattar	100 acres

ii. FGD with Women, Goth Maheser, at Ghotki

	Participants	Occupation / Farm Size
i)	Ms. Shabana	Household wife
ii)	Ms. Khadija	Household wife
iii)	Ms. Rahila Soomro	Household wife
iv)	Ms. Fatima	Household wife
v)	Ms. Halima	Student
vi)	Ms. Rehana	Student
vii)	Ms. Sitara	Household wife
viii)	Ms. Farman	Household wife

iii. New Jamrao Canal, Shahdadpur District Sanghar
Mir Muhammad Minor, Deh Baddo Wasan Abbas Haider Farm

	Participants	Occupation / Farm Size
i)	Mr. M. Khan Wasan	150 acres
ii)	Mr. M. Haji Sanjarani	100 acres
iii)	Mr. Adil	72 acres
iv)	Mr. Dilbar Hussain	30 acres
v)	Mr. Ali Ahmed	10 acres
vi)	Mr. Fazal Kherio	40 acres
vii)	Mr. Mumtaz Bagrani	100 acres
viii)	Mr. Manthar Ali Rind	10 acres
ix)	Mr. Hidayat Ali	10 acres
x)	Mr. Shah Muhammad	15 acres
xi)	Mr. Aijaz	35 acres
xii)	Mr. M. Hari	45 acres
xiii)	Mr. Lal Hari	20 acres
xiv)	Mr. Ghulam Qadir Hari	35 acres
Mr. Lal Bux Bagrani		50 acres
Mr. Abdul Samad Kerio		30 acres
Mr. Jan Punal		20 acres
Mr. Gul Wasan		100 acres

iv. FGD at Mirpurkhas with Small and Medium Farmers

	Participants	Occupation / Farm Size
i)	Mr. Mohammad Azam Rind	Member WCA (FO Sanhro Minor)
ii)	Mr. Faiz Mohammad Mangrio	Secretary (FO Bareji Minor)
iii)	Mr. Ghulam Hyder Lashari	Vice Chairman (FO Bareji Minor)
iv)	Mr. Dawood Mangrio	Member WCA (FO Bareji Minor)
v)	Mr. Ramzan Shar	Member WVA (FO Bareji Minor)
vi)	Mr. Ramzan Maher	Secretary WCA (FO Sanhro Minor)
vii)	Mr. Mohammad Hussain Maher	Member WCA FO Sanhro Minor)
viii)	Mr. Imam Din Maher	Secretary (FO Sanhro Minor)

v. Mirpurkhas with Non-Agricultural Users of Water

	Participants	Occupation / Farm Size
i)	Mr. Abdul Manan Khan	Vice President, Chamber of Commerce
ii)	Mr. Malik Sheeraz	Ex-Member, Chamber of Commerce
iii)	Mr. Sajan Maher	Chamber Member
iv)	Mr. Shafique Siddiqui	Chamber Member
v)	Mr. Razi Khan	Private Business
vi)	Mr. Malik Walayat	Local Councilor
vii)	Mr. Dhanraj	Tharparkar Fertilizer Agency, Agri Business
viii)	Mr. Mohammad Yamin Ghori	Councilor UC-3
ix)	Mr. Ramesh Puri	Councillor UC-7
x)	Mr. Walayat Ali Salari	Mirpurkhas Chamber of Commerce
xi)	Mr. Sardar Abdul Manan Khan	Ex-Vice President
xii)	Mr. Mohammad Shafique Siddiqui	
xiii)	Mr. Malik Sheerz Meli	
xiv)	Dr. Rosi Khan	Civil Hospital
xv)	Mr. Kamran Qureshi	7 No. UC, General Councilor
xvi)	Mr. Gani	UC-11, Councilor
xvii)	Mr. Sajan Mehesr Meli	
xviii)	Mr. Abdul Aziz	Ex-Executive Member, Mirpurkhas Chamber of Commerce and Industry
xix)	Mr. Mohammad Farooq	Executive Member, Mirpurkhas Chamber of Commerce and Industry
xx)	Mr. Muhammad Basit-ullah Baig	Secretary, Mirpurkhas Chamber of Commerce and Industry
xxi)	Mr. Mohammad Shafi Memon	President, Mirpurkhas Sarafa Association

vi. FGD at Thatta (Right Bank Area)

	Participants	Occupation / Farm Size
i)	Mr. Ishaq Mehar	Vice President Chamber of Commerce
ii)	Mr. Kalimullah Khan	
iii)	Mr. Abdur Rab Chohan	
iv)	Mr. Haji Yameen	Councilor
v)	Mr. Abdul Ghani	Chairman, UC-2
vi)	Mr. M. Kamran	UC-7 GS
vii)	Mr. Ramesh Puri	UC-7
viii)	Mr. Basit Baig	Secretary, Member, Chamber of Commerce

Annexure–2 of Appendix C [Jan-Mar.'2006]

Awareness / Disclosure Workshops
For
Sindh Water Sector Improvement Project (WSIP)

I. Introduction:

Sindh Irrigation & Drainage Authority (SIDA) arranged three awareness campaign workshops, one in each of the three Area water Boards, with a view to discussing the issues regarding impact of the upcoming Sindh water Sector Improvement Project (WSIP) which has been under preparation by the Government of Sindh with the help of World Bank since 2003-2004. The objective of the workshops was (i) to create an enabling environment for WSIP through the involvement and participation of all key stakeholders particularly Farmer Organizations and NGOs (ii) to disclose the environmental and social impact issues, (iii) to present / discuss the Project and get feedback. The suggestions and recommendations of the workshop will further be discussed with the implementation agencies during the Project Appraisal Mission and agreed recommendations will be included in the Project.

II. Awareness / Disclosure Workshops:

2. The First workshop was held at Ghotki, headquarter of Ghotki Feeder Area Water Board (GFCAWB) on 19th January, 2006. The second one was held at Badin, headquarter of Left Bank Canal Area Water Board (LBCAWB) on 25th January, 2006, while the third Workshop was held at Mirpurkhas, the headquarter of Nara Canal Area Water Board (NCAWB) on 29th March, 2006.

3. The Ghotki Workshop was presided by Chairman Ghotki Feeder AWB, Sardar Ghulam Hassan Chachar, with Vice Chairman SIDA as Chief Guest. The Badin Workshop was presided by Mr. Anwar Ali Halepoto, District Nazim, Badin with Vice Chairman SIDA as Chief Guest. As for the third workshop held at Mirpurkhas, Syed Ali Gohar Shah, Chairman Farmer Organization Council (FOC) attended this workshop as its Chief Guest while it was presided by Prof. Aijaz Qureshi, General Manager (Transition) SIDA. All these workshops were participated by a large number of the representatives of respective AWBs, FOCs and FOs as well as prominent farmers of the area plus the representatives of NGOs, journalist community and other sections of civil society. The list of participants of each workshop is given at **Annex-2.1**.

4. The workshops were organized in two sessions. The first session was exclusively meant for the dissemination of information about WSIP, its objectives and details of components. The second session was an open session for general discussions in which the participants actively discussed on several issues. The points raised in the open session were replied by officials of SIDA, AWBs and the experts.

5. During the 1st session of each of the workshops, the senior officials of SIDA, AWBs, and technical experts briefed the audience about the salient features of WSIP and its expected impacts. The Participants were told that WSIP interventions would (a) define and implement an enforceable water rights system among users in the selected canal command areas; (b) devolve responsibility for water management including O&M to WCAs and FOs (c) improve the reliability, efficiency and equity

of water distribution, among the agricultural users, (c) modernize the existing irrigation and drainage networks and the on-farm technology to improve water service delivery and use and (d) strengthen the institutional capacity of irrigation institutions in Sindh according to existing water ordinance.

6. The participants were informed that the project would likely generate limited negative environmental impacts, particularly during the construction period that need to be safeguarded. It was for this purpose that GoSindh got the study for "Integrated Social & Environmental Assessment" (ISEA) done by independent consultants.

7. The ISEA analyzed the environmental and social issues. And reached a general conclusion that, based on the nature of physical works and subsequent effects, the negative impacts on the physical and biological environment are very limited whereas the positive impacts would be substantial. The study prepared Environmental management and social action plans also to mitigate possible negative effects. An overall Project Environmental Assessment (EA) and Environmental Management Plan (EMP) has been prepared along with a framework for screening environmental issues for various works expected under the Project and actions that need to be taken to address these before starting implementation of construction contracts of the project.

8. Separate EA and EMPs would be prepared for the three major construction contracts related to rehabilitation of main and branch canals – Ghotki, Nara and Fulleli – as part of the detailed design report, identifying overall and site specific environmental issues along with the management plans. In case of rehabilitation of distributaries and minors the detailed design reports would be prepared for "lots of five distributaries" that are adjacent or as close as possible. The design reports would also include EA & EMP, in addition to technical designs, and form basis of bidding documents.

9. The contract specific EA/EMP would be reviewed and cleared by the M&E consultants who are also responsible for monitoring and supervision of the environmental and social management plans, in addition to project impact assessment. All design reports and EA/EMP related to the large canal rehabilitation contracts, and first five lots of design reports in each AWB for distributary/minors would be reviewed by IDA.

10. To address social safeguard issues that may be caused by any of the rehabilitation and civil works activities in the Project, a Social Implementation Management Framework (SIMF) / Social Action Plan (SAP), incorporating social screening process, is prepared for the Project. Full design report for each canal system and the design reports for rehabilitation and improvement works for the distributary/minor canals would include, in addition to technical aspects; a social impact assessment report, incorporating social safeguard issues i.e. specific impacts on assets, incomes and livelihood, and any impacts on vulnerable groups including nomads and migratory indigenous groups; and appropriate mitigation measures and necessary safeguard documents in accordance with the provisions of the SIMF. Upon approval from the Bank, these design reports would form the basis for preparing the bidding documents for carrying out the construction works.

V. Conclusion of the Workshops:

(i) The participants of the workshops were reassured that all possible steps would be taken during the implementation of the project to avoid, minimize and mitigate the adverse effects of the project on the environment. The response of the participants was very positive. Most of them welcomed WSIP. They also appreciated the policy of seeking views of the stakeholders about the program before its implementation, particularly its environmental impacts and measures for their mitigation and indicated their desire to help in mitigating these effects; even the representatives of NGOs offered their services for making the new program successful.

(ii) Some of key figures of the society like District Nazim, Badin, not only welcomed new program but even offered all possible cooperation of District Government Badin to implement the Project. The Chairman GFCAWB was also extremely enthusiastic in making on going irrigation reforms as well as the new WSIP program completely successful and offered all possible cooperation to this effect. He was of the view that the objectives for WSIP would go a long way to make FOs effective in O&M of I&D system and to alleviate rural poverty.

(iii) A member of GFCAWB proposed at Ghotki Workshop to create a system in which it is made mandatory to provide full information to the farmers about the water supplied to them. An important proposal was mooted out by some participants at Badin Workshop as well as Mirpurkhas Workshop to make necessary amendments in relevant laws, rules & regulations etc. for creating harmony & close cooperation between both the new systems viz. District Government System, Participatory Irrigation Management System, at grass root level i.e. between FOs and Union Councils, to work jointly for making both the systems successful as both the systems are aimed at devolving powers at lowest level. The organizers appreciated the two proposals; they were informed that while the transparency and dissemination of water supply information to the farmers was integral part of WSIP, Coordination between PIM and devolved local Government system would be further strengthened.

Details on Workshop Participants

(the proceedings of all the three workshops have been summarized in this annexure. A detailed statement of these proceedings have been put on the website)

Composition of Participants of 1st Workshop held at Ghotki
A total of 97 individuals participated in the workshop. Of these 30 were from SIDA and other officials, 52 were farmers and the rest were from media.

Composition of Participants of 2nd Workshop held at Badin
A total of 75 individuals participated of these 27 were from SIDA and other officials, 41 represented farmers and rest were from the media.

Composition of Participants of 3rd Workshop held at Mirpurkhas
A total of 80 individuals attended the workshop. Of these, 26 were officials from SIDA and other government departments, 50 were farmers and the rest were from media.

Annex-2.1 of Appendix - C

List of Participants of 1st Workshop held at Ghotki

#	Name	Designation	Organization
1	Ghulam Hassan Chachar	Chairman	GFCAWB
2	Imdad Ali	Chairman	FO Bhiro
3	Haji Mohd: Ashraf	Vice Chairman	FO Bhiro
4	Sher Muhammad Maher	Chairman (FOC)	Ghotki
5	Abdul Farooq	Vice Chairman	FO Qadir Pur
6	Abdullah Ruk	Vice President	Abadgar Board
7	Imam Bux Jhulan	Chairman	FO Junas
8	Abdul Sattar Qazi	Chairman W/C 2AR	FO Bari Minor
9	Hafiz Ahmed Aziz Qazi	W/C Bari Minar	FO Bari Minor
10	Muhammad Yousif Bhutto	Chairman	FO Mehroo
11	Muhammad Issa	Secretary	-- Do --
12	Ghulam Nabi	Treasurer	-- Do --
13	Hashim Jatoi	Member	-- Do --
14	Muhammad Jamil leghari	Chairman	FO Melher
15	Moulvi Ghulam Nabi	Secretary	-- Do --
16	Khan Muhammad	Member	-- Do --
17	Noor Muhammad	Chairman	FO Sher Khan
18	Pyaro Khan Kalwar	Secreta.	-- Do --
19	Yousif Mako	Treasurer	-- Do --
20	Mir Khan Mehar	Chairman	FO Bakro
21	Choudhry Arshad	Vice Chairman	-- Do --
22	Raza Muhammad	Member	-- Do --
23	Nazir Ahmed	Member	-- Do --
24	M.Sadique Hadrani	Vice Chairman	FO Masu
25	Ubedullah Marnas	Secretary	-- Do --
26	Raes Palo Naich	Member	-- Do --
27	Dr.Sher Muhammad	Member	FO Junas
28	Ali Nawaz Chachar	Chairman	FO Qadir Pur
29	Muhammad Ahad	Secretary	-- Do --
30	Dr.Abdul Razaq Khosa	Chairman	FO Sangi
31	Abdul Khaliq	Member	-- Do --
32	Sardar Ali	Treasurer	-- Do --
33	Muhammad Ashraf Janjua	Vice Chairman	FO Bhiro
34	Jamaluddin Gadani	Treasurer	-- Do --
35	M.Ibrahim Mangrio	Member	-- Do --
36	Nabi Bux Chachar	Secretary	Fo Tibi
37	Muhammad Amin	Member	-- Do --
38	Miandad Jatoi	Vice Chairman	FO Baiji
39	Mirza Khan	Press Reporter	Daily Ibrat

#	Name	Designation	Organization
40	Ghulam Hussain	Member	FO Bhiro
41	Malik Khushi Muhammad	Farmer	Farmer
42	Sarwar Mirbahar	Chairman	Sewai Foundation
43	Ghous Bux Ghoto	Chairman	FO Tibi Minor
44	Muhammad Yousif Maher	Chairman	FO Sher Khan
45	Ubedullah Abbas	Vice Chairman	FO Junas
46	Muhammad Azeem	Vice Chairman	Tibi Minor
47	Naeem-uddin	Field Engineer	SRSO
48	Ali Gul Khushk	Rrgional Prog.Cord.	SRSO
49	Anwar Ali	Social Worker	VWA
50	Mian Muhammad Sharif Qureshi	Member	AWB GHOTKI
51	Hafiz Muhammad Ahmed	Gen. Secretary	Qadir pur
52	Sardar Ahmed	Vice Chairman	Malir Minor
53	Muhammad Shakir	Vice Chairman	Bari Minor
54	Asif Hamid	Chairman	Masu Minor
55	Sher Ali	Treasurer	FO Bakro Minor
56	Bashir Ahmed	Secretary	FO Bhiro Minor
57	Niaz Channa	Reporter	Sindh TV.
58	Noor Hassan Khoso	Press Reporter	Daily Khabrain
59	Amanullah	Press Reporter	Daily Mehran
60	Mushtaq Shaikh	Press Reporter	Daily Tameer Sindh
61	Arshad Ahmed	Chairman	FO
62	Saleemullah	Farmer	Bhand Minor
63	Fazal Hussain	Secretary General	CSOC Ghotki
64	Hussain Saaran	Chairman	RDOCC Ghotki
65	Abdul Hafeez Dayo	Lecturer	Education
66	Ayaz Latif Dayo	Chairman	SRWA Ghotki
67	Abdul Raouf Soomro	Gen. Secretary	SRWA Ghotki
68	Abdul Hakeem	Member	SRWA Ghotki
69	Abdul Majeed	Member	Abadgar Board
70	Muhammad Yousif	Chairman	FO Mehro link
71	Muhammad Zafar Iqbal	Press Reporter	Daily Ibrat
72	Wali Muhammad	XEN Mirpur	AWB GHOTKI
73	Anwar Ali sial	A.XEN Pano S/D	AWB Ghotki
74	Nisar Ahmed	A.XEN	AWB Ghotki
75	Ghulam Mustafa	A.XEN Masu S/D	AWB Ghotki
76	Suresh Kumar	A.XEN T/Well Ghotki 11	AWB Ghotki
77	Abdul Sattar Sario	A.XEN Mahesro S/D	AWB Ghotki
78	Zahid Hussain Qureshi	A.XEN Daherky	AWB
79	Muhammad Moosa	A.XEN. Yuro S/D	AWB Ghotki
80	Khursheed Ahmed Khoso	A.XEN	SCARP
81	Rashid Ahmed Gabol	A.XEN	SCARP

#	Name	Designation	Organization
82	Muhammad Aslam	Sub Engineer	AWB Ghotki
83	Shamsuddin Soomro	Sub Engineer	AWB Ghotki
84	Khadim Hussain	Sub Engineer	AWB Ghotki
85	Shafiq- ur- Rehman	Junior Engineer	PIA Consultant
86	Dr, Nisar Ahmed Memon	Team Leader	Consultant(SOFWM)
87	Miandad	Canal Assistant	AWB Ghotki
88	Muhammad Bux Bhutto	Canal Assistant	AWB Ghotki
89	Zaber Dast Khan	Member	AWB
90	Munawar Ahmed Mangrio	Field Team Leader	PIA Consultant(SOFWM)
91	Nawab Ali Khand	D.O (NPIW)	AWB Ghotki
92	Prem Chand	D.O (NPIW)	AWB Ghotki
93	Prof: Aijaz Ahmed Qureshi	GM Transition	SIDA
94	Mr. Nazir Ahmed Essani	Social Development Specialist	SIDA
95	Mr. G.N Mughul	Communication Specialist	SIDA
96	Mr. Noor Hussain Chand	Information Kiosk Assistant	SIDA
97	Muhammad Umar Khawaja	Information Kiosk Assistant	SIDA

List of Participants of 2nd Workshop held at Badin

#	Name	Designation	Organization
1	Maj. Rtd. Omer Farooq	Acting Chairman	(LBCAWB) Badin
2	Haji Muhammad Nawaz	Member	(LBCAWB) Badin
3	Muhammad Qasim	Secretary	FO Mehrab Minor
4	Asghar Ali Chahar	Coordinator	FOC Badin
5	M. Rafiq	Chairman	FO Wangi Minor
6	Dr. Munawar	Member	FO Mubarak Minor
7	Muhammad Mehar	Chairman	FO Daderko Minor
8	Muhammad Qasim	Farmer	FO Mehrab Minor
9	Noor Muhammad	Farmer	FO Chakri Minor
10	Haji Munawar Ali	Chairman	FO Chakri Minor
11	Abdullah	Member	FO
12	Gulam Rasool Palejo	Secretary	FO
13	Muhammad Aamer Abbasi	Treasurer	Kundir Minar
14	Ghulam Rasool Paleejo	Secretary	Chaghery Minor
15	Muhammad Aamer Abbasi	Former	FO
16	Gul Muhammad	Chairman	WC Badin
17	Haji Muhammad Sadiq	President	Sindh Abadgar Board
18	M.Shaheed Shah	Chairman	FO Dodo
19	Aachar Gopang	Secretary	-- Do --
20	Nawab Asad	Treasurer	-- Do --
21	Mazhar	Member	-- Do --
22	Sallahuddin	Member	-- Do --
23	Kamal Noonari	Chairman	FO Pandhi Wah
24	A,Karim Baloch	Secretary	-- Do --
25	Shabri	Member	-- Do --
26	Ismail	Member	-- Do --
27	Noor A.Samoon	Chairman	FO Shah Bukhari
28	Akbar	Vice Chairman	-- Do --
29	Ghulam Jeelani	Secretary	-- Do --
30	Bashir Ahmed	Treasurer	-- Do --
31	Mir Ghazi	Member	-- Do --
32	M,Rahim	Member	-- Do --
33	Choudhry Adalat	Chairman	FOC Point
34	Khizer Hayat	Member	-- Do --
35	Munir Ahmed	Secretary	-- Do --
36	Shahid Khan	Member	-- Do --
37	Sabir Khan	Treasurer	Wangi Minor
38	Rab Dino Sarejo	Member	Sindh Chamber of Agr.
39	Gulan Khan	Farmer	Tehsil Badin
40	Mir Bahadur Talpur	Farmer	Tehsil T,M,Khan
41	Allah Bachayo	Team Leader	PIA Consultant

#	Name	Designation	Organization
42	Imtiaz Ali Jokhio	Field Engineer	(NRSP) Badin
43	Shabana	Farmer	Young Shidi
44	Saba	Farmer	Young Shidi
45	Iram Abro	Program Officer	W.D.A
46	Tabbasum	Field Worker	W.D.A
47	Raja	P.M	W.D.A
48	Shafi Memon	Press Reporter	The Nation. Aaj TV Badin
49	Abdul Majeed	Press Reporter	Awami Awaz Newspaper
50	Abdul Latif	Press Reporter	Daily Hilal-e-Pakistan
51	Professor Aijaz Ahmad Qureshi	GM. Transition	SIDA
52	Dr. Mumtaz Ahmed Suhag	GM. R&D	SIDA
53	Mr.Nazeer Ahmed Memon	DGM (SDC)	SIDA
54	Mr G.N. Mughul	DGM (M&C)	SIDA
55	Mr.Muhammad Ali Maher	DGM (Operation)	SIDA
56	Irshad Ahmed Bohio	Team Leader Environment	SIDA
57	Noor Hussain Chand	Information Kiosk Assistant	LBCAWB Badin
58	Jamal Qureshi	Communication Assistant	SIDA
59	Babar Afandi	XEN Phuleli	SIDA
60	Shafi Muhammad	A. XEN	SIDA
61	Muhammad Ibrahim Shoro	A. XEN	SIDA
62	Shankar Lal	WMO (SMG) Badin	SIDA
63	Mehboob Ahmed Memon	S.O	SIDA
64	Faiz Ahmed	XEN Akram Wah	SIDA
65	Khair Muhammad	XEN Guni Canal	SIDA
66	Abdul Ghafoor Memon	A.XEN Golarchi	SIDA
67	Muhammad Hanif Arain	A,XEN Talhar	SIDA
68	Moula Bux	A.XEN	SIDA
69	Babar Afandi	XEN	SIDA
70	M. Abdul Ellahi	Treasurer	SIDA
71	Choudhari Saleem Ahmed	Vice Chairman	FO
72	Azizullah	AXEN	SIDA
73	Mir Muhammad	Clerk	SIDA
74	Khuda Bux Memon	D.O (WM) Badin	Agriculture
75	Majid Hussain	Former	FO

List of Participants of 3rd Workshop held at Mirpurkhas

#	Name	Designation	Organization
1	Sayed Ali Gohar Shah	Chairman	FOC Mirpurkhas
2	Ghulam Mustafa Dahri	Director	NCAWB
3	Doctor Nisar Memon	PIAC Teem leader	SIDA
4	Mir Shahzad Talpur	Progressive landlord	Dist. Mirpurkhas
5	Yaar Muhammad Baloch	Member	NCAWB
6	Choudhry Maqbool	Member	NCAWB
7	Faiz Muhammad Junejo	Chairman	FO Patoyoun
8	Saleem Raza Malkani	Chairman	Sanhro Distributary
9	Zahid Noon	Farmer	FO
10	Ghous Lighari	FTI	SIDA
11	Rao Ayub Khan	V. Chairman	Khatian Minor
12	Professor Yousif	Chairman	Samro Shakh
13	Eng.Abdul Baqi Memon	FTI	PIAC Mirpurkhas
14	Saleem Malkani	Chairman	FO Sunharo
15	Muhammad Shanil	XEN J D	
16	Ghulam Hyder	Farmer	FO
17	Waqar Hassan	FTI	SIDA
18	Hanif	Farmer	FO
19	Hussain	Farmer	FO
20	Muhammad Saleem	Farmer	Lal Khan Distry
21	Muhammad Khan	V Chairman	Lal Khan Distry
22	Arif Lakho	Nazim	U C Daulatpur
23	Ali Nawaz	Taulka Naib Nazim	H B M
24	Suhail Ali	Farmer	FO
25	Sohrab Khan	Farmer	FO
26	Faiz Muhammad	Secretary	FO Baiji
27	Imamuddin Mahar	Secretary	FO Sanhro
28	Zulfiqar Ali Bhutta	Secretary	FO Hir Minor
28	Manzoor Ali Bambhro	Treasurer	Bhurgri Minor
30	Khalid	Farmer	FO
31	Zeeshan Baloch	Member	FO
32	Masroor Shahwani	SO	SIDA
33	Mohsin Ali	WMO	SIDA
34	Musrat Shaheen	WMO	SIDA
35	Saeed Jagrani	XEN	M D
36	Abdul Sami Ansari	FO Coordinator	NCAWB
37	Allah Bachayo	Vic Chainman	Dabaco Minor
38	Abdul Sattar Memon	T R	Dabaco Minor
39	Syed Ghulam Murtaza	Chairman	Hatoongo Minor
40	Haji Qaim	Chairman	Daulat Minor
41	Haji Ghulam Qadir	Secretary	Gorchani Minor
42	Haji Hashim Ali	Farmer	FO

#	Name	Designation	Organization
43	Muhammad Yousif	Chairman	Barochani Mnior
44	Ghulam Ali	Gen Secr.	SVDO Mirpurkhas
45	Mumtaz Muri	Taluka Naizm	Hussain Bux Mari
46	Pritamdas	SDO	T& P
47	Naeem Memon	SDO	T & P
48	Ayaz Ali Khawaja	SO	SIDA
49	Abu Bakar Rind	Journalist	Press Club
50	Muhammad Bux Kapri	Journalist	Press Club
51	Magan Halepoto	Chairman	Dooso Minor
52	Ali Hassan Noor	Markazi Coordinator	NCHD
53	Yar Muhammad	Farmer	FO
54	Azhar	Secretary	Rawtiani Minor
55	Haji Ghulam Muhammad	Vic Chairman	Daraji Minor
56	Khadim Hussain	Farmer	FO
57	Ghulam Rasool	FTI	SIDA
58	Maqbool Ahmed	Member	NCAWB
59	Altaf Hussain Shah	Do	Do
60	Muhammad Yaqoob	Chairman	Kahu Minor
61	Aijaz Ali	Do	Chaloo Minor
62	Mir Rustam Talpur	FO	Danjan
63	Mumtaz Mari	Farmer	Kahu Minor
64	Nabi Bux Laghari	Chairman	Chaloo Minor
65	Syed Gulzar Ali Shah	Member	SIDA Board
66	Asadullah Hakro	LA	
67	Zulfiqar Ali Memon	FTI	SIDA
68	Ghulam Ali	Farmer	Dabco Minor
69	Faiz Muhammad Junejo	Chairman	Potoyun
70	Muhammad Hayat	Farmer	Farmer
71	Abdul Qadir	Chairman	Water Course 55
72	Muhammad Sarwar Arain	Farmer	Daulatpur Minor
73	Masood Wasasn	Member	Mirpur Distributary
74	Professor Aijaz Qureshi	GMT	SIDA
75	GN Mughul	DGM (M&c)	SIDA
76	Ghulam Mustafa Ujjan	Group leader (SMG) (SDC)	SIDA
77	Habib Ursani	(DGM) Flood & Protection	SIDA
78	Miss Shakila Lighari	S O	SIDA
79	Noor Hussain Chand	IKA	SIDA
80	Jamal Qureshi	Communc. Asst.	SIDA

Annexure–3 of Appendix C [October' 2006]

Project Brief And Issues Discussed During Consultative Meetings At Ghokti, Badin and Mirpurkhas in October 2006

MAJOR OBJECTIVE

To improve efficiency, reliability and equity of irrigation water distribution in three Area Water Boards (AWB) namely Ghotki, Nara and Left Bank.

PROCESS ENVISAGED

i) Deepening and broadening the institutional reforms already underway in Sindh.
ii) Improving the system in a systemic way covering key hydraulic infrastructures (i.e. barrages), main and branch canals, and distributaries and minors.
iii) Enhancing long term sustainability of irrigation system through participatory irrigation management and developing institutions for improving operation and maintenance of the system.

LIKELY BENEFITS

i) Increased agricultural production on 1.8 million hectares.
ii) Higher employment in farming and agricultural marketing.
iii) Increased income levels helping reduce rural poverty in Sindh.

PERFORMANCE INDICATORS

i) Increased conveyance efficiency across canals, distributaries/minors, watercourses and farms,
ii) Reduced discharge of drainage water,
iii) Higher consistency between water supplied by the system and water demanded by the farmers through a close monitoring on a ten-day. monthly, seasonal and annual basis.
iv) Reduced incidences of canal breaches,
v) Regular measurement of delivery performance ratio (DPR) between watercourses located at head and tail of the canal system.
vi) Farmers participation through F.O.'s (Farmers Organizations) in taking over distributary/minor canals control and IDMTA (irrigation and Drainage Management Transfer Agreements),
vii) Increase in abiana collections to be managed by the F.O.'s, and assurance of adequate repair and maintenance work at distributary/minor level by the F.O.'s,
viii) Reduction in area with shallow ground water and soil salinity.

PROJECT COMPONENTS

A:	Community Development and Capacity Building	US$ 10 Million
B:	Rehabilitation and Improvement of Irrigation and Drainage System including: i) Main & Branch Canals ii) Distributaries & Minors iii) Improvements of Drainage System iv) Design & Construction Supervision	US$ 135.9 Million
C:	Asset Management of Major Irrigation & Drainage Infrastructure including: i) Feasibility Studies of Barrages ii) Preparation of Master Plan for Left Bank, Delta and Coastal Zone	US$ 14 Million
D:	Monitoring & Evaluation of the Project Impact & Environmental Management Plan	US$ 4.2 Million
E:	Project Coordination, Monitoring, Technical Assistance and Training	US$ 10 Million
	Total	**US$ 174.1 Million**

Key Questions asked for discussion:

In your view would this project (SWSIP) provide the intended benefits? (Explain how, whether the audience responds in negative or positive).

1. Which particular component of SWSIP is likely to be more beneficial for the farming community and why?
2. Which particular component of SWSIP is likely to be the least beneficial or problematic and why?
3. What could be the potential constraints for water users in establishing Farmers Organization at the distributary/minor level?
4. How do you view the perceived representation of farmers at different tiers of SIDA i.e. SIDA's governing body, AWB and particularly at F.O. level? Will such representation ensure effective participation of farmers? If no, what other measures would be required?
5. Do you consider the election process at F.O. level to be fair? if not, why?.
6. Do you think tenant and females should also be given representation at F.O. and other levels? Give reasons whether you are in favor or against it.
7. Given the project components, do you favor or disfavor the likely consequences as explained below? (for each of the following, kindly also suggest remedial measures)

    a) displacement of farmers from the land (resettlement issue)
    b) displacement of indigenous people (cultural and economic issues)
    c) environmental concerns e.g. loss of soil, dust accumulation, disturbance to birds, loss of pond/lake, drainage issues, water logging and salinity.

LIST OF PARTICIPANTS

1. Ghotki: October 5, 2006

#	Name	Organization
NGOs/Civil Society		
1	**Mr. Ayaz Latif Dayo**	**SRWA**
2	**Mr. Abdul Rauf**	**SRWA**
3	**Mr. Ghulam Murtaza**	**SWA**
4	**Mr. M. Ilyas**	**SWA**
5	**Mr. Imtiaz Ahmed**	**Young Lanjari Welfare Association**
6	**Mr. Fazal Kalhorro**	**Sachal Samaji Organisation**
7	**Mr. Abdul Rauf Tajpuri**	**Almadud CSWA**
8	**Mr. Hussain Sarang**	**CSOC**
9	**Mr. Azizullah Mahar**	**SALDO**
10	**Mr. Muhammad Ali**	**Sewai Foundation**
11	**Ms. Rehana Hyder Joyo**	**SRSO**
12	**Ms. Samreen Khan**	**Marie Stopes**
FOs/Farmers		
13	**Mr. Qazi Abdul Sattar**	**Sindh Abadgar Board**
Hari/Indigenous Community		
14	**Mr. Hafiz Abdul Aziz**	**Hari**
15	**Mr. Ahmed Ali**	**Fishermen**
16	**Mr. Ditto**	**Bheel**
17	**Mr. Sharoo**	**Bheel**
SIDA/AWB/Officials		
18	**Mr. Khalid Peerzado**	**SIDA**
19	**Mr. Mumtaz Ali Zardari**	**OFWM-Agriculture Department**
20	**Ghulam Hussain Chachar**	**Chairman GFCAWB**
21	**Dr. Mumtaz A Sohag**	**SIDA**
22	**Mr. Ali Anwar Chandio**	**EMU-SIDA**
23	**Mr. Karim Bux**	**SDC-SIDA**
24	**Mr. Mustaffa Ujjan**	**SDC-SIDA**
25	**Mr. Nazir A Memon**	**SIDA**

2. Badin: October 7, 2006

#	Name	Organization
NGOs/Civil Society		
1	**Ms. Nusrat Khatti**	**NRSP**
2	**Mr. Faiz Uddejo**	**DAMN**
3	**Mr. Abdul Majeed**	**SSER**
4	**Mr. Aijaz Memon**	**HANDS**
5	**Mr. Kawish Ali**	**YSWO**
6	**Dr. Akash Ansari**	**BRDS**
7	**Mr. Suleman Soomro**	**VDA**
8	**Mr. Ghulam Hussain**	**VDA**
9	**Ms. Razia Sultana**	**FPAP**
10	**Mr. Khadim Talpur**	**Save Coast Action Committee**
11	**Mir Mohd Baladi**	**Save Coast Action Committee**
12	**Ms. Fahmida Soomro**	**LHDP**
13	**Ms. Sanam Abbasi**	**LHDP**
14	**Mr. Abdul Hakeem**	**LHDP**
15	**Ms. Abida Jamali**	**Pakistan Fisher Folk**
16	**Makkal Shah**	**Pakistan Fisher Folk**
17	**Mohd Qasim Mallah**	**Pakistan Fisher Folk**
SIDA/AWB/Officials		
18	**Mr. M Saleem Memon**	**SDC-SIDA**
19	**Mr. Ashfaq Baloch**	**SDC-SIDA**
20	**Mr. Sikandar Ali Abrro**	**SDC-SIDA**
21	**Dr. Mumtaz A Sohag**	**SIDA**
22	**Mr. Ali Anwar Chandio**	**EMU-SIDA**
23	**Mr. Ayaz Ali Khwaja**	**SDC-SIDA**
24	**Mr. Mustaffa Ujjan**	**SDC-SIDA**
25	**Mr. Sheeraz Gul**	**SDC-SIDA**
26	**Mr. Tilok Chand**	**SDC-SIDA**
27	**Mr. Zubair Memon**	**SDC-SIDA**
28	**Mr. Abdul Sattar**	**SDC-SIDA**
29	**Mr. Shazado Malik**	**SDC-SIDA**
30	**Mr. Akhtar Hai**	**M/S Osmani and Co**
31	**Professor Aijaz A Qureshi**	**SIDA**
32	**Mr. Nazir A Memon**	**SIDA**

3. Mirpurkhas: October 8, 2006

#	Name	Organization
NGOs/Civil Society		
1	**Mr. Wajid Leghari**	**SindhNet**
2	**Mr. Abdul Haq Banglani**	**SindhNet**
3	**Mr. Ali Hassan Noon**	**SDSSP**
4	**Mr. Khalid Babbar**	**Jaggarta SWO**
5	**Mr. M. Aslam Panhwar**	**NSSS**
6	**Mr. Qurban Ali**	**NRSP**
7	**Mr. Taj M Baloch**	**SGA**
8	**Ms. Farzana Khalid**	**Social Worker**
9	**Ms. Moomal Leghari**	**NRSP**
10	**Mr. Rao Ayub Khan**	**LSRDA**
FOs/Farmers		
11	**Mr. Aijaz Panhwar**	**Chairman FO**
12	**Mr. Hazari Lal**	**Farmer**
13	**Mr. Muhammad Yaqoob**	**Chairman FO**
14	**Mr. Saleem Malkani**	**Chairman FO**
Hari/Indigenous Community		
15	**Mr. Sarwah Kumar Bheel**	**Bheel/GRD**
16	**Mr. Kanjee Rano Bheel**	**Bheel/**
17	**Mr. Ramoo Kohli**	**Kohli/Hari**
SIDA/AWB/Officials		
18	**Mr. Ghous Leghari**	**SDC-SIDA**
19	**Mr. Abdul Rasheed Mahar**	**SDC-SIDA**
20	**Mr. Shahnawaz Baloch**	**SDC-SIDA**
21	**Dr. Mumtaz A Sohag**	**SIDA**
22	**Mr. Ali Anwar Chandio**	**EMU-SIDA**
23	**Mr. Mustaffa Ujjan**	**SDC-SIDA**
24	**Mr. Akhtar Hai**	**M/S Osmani and Co**
25	**Professor Aijaz A Qureshi**	**SIDA**
26	**Mr. Nazir A Memon**	**SIDA**

APPENDIX-D: SOCIAL IMPACT MANAGEMENT FRAMEWORK

PAKISTAN
SINDH IRRIGATION AND DRAINAGE AUTHORITY

SINDH WATER SECTOR IMPROVEMENT PROJECT – PHASE I

SOCIAL IMPACT MANAGEMENT FRAMEWORK

November 2006

DESCRIPTION OF ABBREVIATIONS USED

NDP	**National Drainage Program**
PAP	**Project Affected Persons**
R&R	**Resettlement and Rehabilitation**
RP	**Resettlement Plan**
LPC	**Land Purchase Committee**
LVC	**Land Valuation Committee**
NGO	**Non-Government Organization**
AWB	**Area Water Board**
PIDA	**Provincial Irrigation & Drainage Authority**
PLAO	**Project Land Acquisition Office**
WEC	**WAPDA Environmental Cell**
SIO	**Sub-project Implementation Office**
GRC	**Grievance Redress Committee**
LAC	**Land Acquisition Collector**
GOP	**Government of Pakistan**

1. INTRODUCTION

1.1 Preamble

1. The overarching objective of the Sindh Water Sector Improvement Project (WSIP) is to improve efficiency, reliability and equity of irrigation water distribution in the three AWBs This would be achieved by: (a) deepening and broadening the institutional reforms that are already underway in Sindh; (b) improving the irrigation system in a systematic way covering key hydraulic infrastructure, main and branch canals, and distributaries and minors; and (c) enhancing long-term sustainability of irrigation system through participatory irrigation management and developing institutions for improving operation and maintenance of the system. Component 'b' would include about 700 km of the main and about 1400 km of the branch canals of Ghotki, Nara and Fulelli canal systems. In addition, about 369 distributarties and minors would be rehabilitated and improved under the project.

2. The Phase I of the project would comprise sub-projects in the three AWBs, some of which may cause adverse social impacts, including land acquisition, and displacement of people. Some land acquisition may also be necessary for the rehabilitation and repairs of distributaries and minors sponsored by FOs. In sub-projects with land acquisition and/or impacts on peoples incomes and livelihood, the present Social Impact Management Framework (SIMF) presents the process for screening of sub-projects; procedures for assessment of adverse social impacts; and defines measures that WSIP will take to compensate and rehabilitate Project Affected Persons (PAPs) and mitigate other social impacts, with the objective that they will improve or at least regain their previous standard of living.

2. RATIONALE FOR THE SIMF

1. This Social Impact Management Framework (SIMF) lays out the legal, institutional, and implementation framework to guide the compensation for loss of assets, business incomes and livelihood; resettlement and rehabilitation involving PAPs who will be adversely affected by any of the investment components of the WSIP.

2. This SIMF provides overall guidance on process and procedures required for management of social impacts due to the sub-project activities in WSIP. The principles, legal and institutional framework and implementation procedures will be applicable to all sub-projects of WSIP.

3. The Resettlement component of the WSIP will be designed under the policy guidelines and procedures developed by the Government of Pakistan and IDA for projects involving involuntary resettlement. These include the relevant laws of Pakistan (as summarized in the legal framework section of this document), as well as the World Bank's Operational Policy 4.12 on *Involuntary Resettlement.*

3. LEGAL FRAMEWORK

3.1 Land Acquisition Act

1. The present general law for acquisition of land for public purposes, the "*Land Acquisition Act*" was introduced in 1894. This Act is the principal statute laying down the framework for the exercise of the right of eminent domain of the State. The land acquired under the Act is vested in the Province and is only thereafter that the Province may transfer it to someone else. The provisions of the Act are supported by regulations setting out the procedure for land acquisition provided in the "*Land Acquisitions Rules, 1983 of Sindh Government*".

2. A review of the Land Acquisition Act 1894 together with definition of compensation and valuation procedures is provided in the main report. The Land Acquisition Act of 1894 provides relief only to property owners who are entitled to receive compensation for loss of land, houses and other buildings, agricultural infrastructure, and crops or trees. However, in addition to compensation for loss

of property, the SIMF also includes other entitlements to ensure that where required, PAPs receive assistance regarding resettlement and income rehabilitation.

3.2 Section 17 of the Land Acquisition Act and the WSIP

1. Section 17 of the LA Act regarding taking of land under emergencies will not normally be applied for land acquisition under the WSIP project unless there are undue delays in finalizing land acquisition after the regular procedures are applied in a timely manner, and only if emergency measures may be deemed necessary, SIDA will consult IDA on utilizing alternative procedures.

4. OBJECTIVES

1. Social impact management in the project will be guided by the following policy objectives:

Avoiding or Minimizing Resettlement: Adverse impacts (Land Appropriation and resettlement) in the project would be avoided or minimized through appropriate technical and management alternatives. These alternatives would be discussed with the stakeholders before making a final decision.

Proper Rehabilitation: WSIP and the participating agencies would rehabilitate the Project Affected Persons (PAPs) properly in a timely, transparent and progressive manner. The entitlement framework (and the RP, if any), grievance redress mechanism, legal options, etc. would be disseminated among the concerned stakeholders. The implementation of resettlement plans would aim at sustainable livelihood options that would at least restore, if not improve, the standard of living of the PAPs. In the case of displacement, they should be provided adequate support during transition period.

Stakeholder Participation: The project authorities would ensure that stakeholders participate in all the project activities including planning and implementation of mitigation measures. The participating agencies would address the PAPs legitimate concerns and provide opportunities and avenues for their participation. In order to provide greater ownership and sustainability, the PAPs would be a part of the decision making process, where appropriate.

Protection to Vulnerables: Protecting the marginalized, socially and economically disadvantaged including women, children and other vulnerable groups and provide opportunities for such groups to take advantage of the investments. The endeavor would be to address equity and inclusion issues in the project design itself. Gender issues will be addressed through women empowerment in all the project activities.

5. DEFINITIONS AND ELIGIBILITY STATUS

5.1 Definitions

Agricultural laborer means a person who does not own land but earns his/hers main income from working on land owned by others;

'Cut-off date': is the date prior to which the occupation or use of the project area makes residents/users of the project area eligible to be categorized as affected persons. Cut-off-date for PAPs with legal titles would be the date of notification under Section 4 of the LA Act. For those without titles, the cut-off-date will be the date of commencement of census.

'Encroachers': are those owners of land adjacent to public property, who have illegally extended their land holdings or structures into the public land.

'Household (HH)': A household is a group of persons who commonly live together and would take their meals from a common kitchen.

'Land': The term land refers to land acquired under the Land Acquisition Act or through private transactions.

Project Affected Persons (PAP) includes any person or persons, households, a firm, or private or public institution who, in the context of acquisition of assets and change in land usage, as of the cut-off date, on account of the execution of the project, or any of its subcomponents or part, would have their:

(a) Standard of living adversely affected;
(b) Right, title, or interest in any house, land (including residential, commercial, agricultural and grazing land) or any other moveable or fixed assets acquired or possessed, in full or in part, permanently or temporarily adversely affected; or
(c) Business, occupation, places of work or residence or habitat adversely affected, with or without displacement.

PAP means persons or affected household and consists of all members of a household residing under one roof and operating as a single economic unit, who are adversely affected by a project or any of its components. For resettlement purposes, affected persons will be considered as members of affected households.

'**Replacement Cost**': means and include an amount needed to replace an asset at current value including depreciation and overhead expenses of the transaction, including stamp duty and registration charges, as follows:
(a) Agricultural land based on its productive potential;
(b) Residential land based on market value;
(c) Houses and other related structures based on current market prices of building materials and labor, without depreciation and deductions for salvaged building materials, plus transaction costs (such as administrative charges, registration and titling costs), etc.;
(d) Trees, crops and plants on current market value; and;
(e) Other productive assets like shops and commercial assets based on current market value of similar location attribute i.e. premium etc;

'Squatters': are persons who occupy / possess an asset without legal title.

Tenant means a person utilizing/cultivating land owned by someone else in return for payment in cash or kind;

'Vulnerable groups'. These are distinct groups of people who might suffer disproportionately or face the risk of being marginalized from the effects of resettlement and specifically include: (i) female headed households with dependents, (ii) disabled household heads, (iii) households falling under the generally accepted indicator for poverty, (iv) elderly households with no means of support and landlessness; (v) households without security of tenure; and (vi) ethnic minorities and indigenous peoples.

5.2 Eligibility Status

1. The cut-off date for determining eligibility to asset compensation shall be the date of notification under Section 4 of the Land Acquisition Act. The cut-off date for all other entitlements will be the completion of the census of PAPs. A 100% census of the PAPs and their loss of assets will be conducted by the project, and this census will be instrumental in establishing the eligibility of the PAPs regarding compensation. Attention will be paid to record the absentees during the census to complete their records at a later date.

6. IMPACTS AND ENTITLEMENT FRAMEWORK

6.1 General Principles of Entitlements

1. PAPs will be provided with compensation at full replacement cost, without depreciation for all assets, including water wells, electric and water connections affected in part or in full by the project,.

2. All PAPs severely affected by the project due to the loss of productive assets, incomes and employment will be entitled to the income rehabilitation assistance depending upon their needs and priority. These rehabilitation measures would specifically focus severely affected (displaced) PAPs, vulnerable groups, itinerant workers, small businesses and those either below the poverty line, or those severely affected by the project due to the loss of productive assets and are likely to fall below the poverty line. Economic rehabilitation assistance can include measures such as (i) preferential employment as laborer on sub-project civil works, (ii) land leveling on remaining land after acquisition to enhance productivity and save water, (iii) agricultural extension, and (iv) vocational training where feasible. Detailed baseline survey and socio-economic data will identify such vulnerable groups, and the scope and need for specific rehabilitation measure will be assessed during the project implementation stage in consultation with the PAPs. At least 30% of such rehabilitation assistance measures will be reserved for women.

3. In cases where community infrastructure such as schools, factories, water resources, roads, sewage system or electrical supply is damaged, project developers will ensure that these would be restored or repaired as the case may be, at no cost to the community.

4. PAPs without any legal title or ownership right to the land they occupy will be compensated for all their lost assets such as house/structure, fixed assets, shop/kiosk at full replacement cost and provided assistance in finding suitable relocation site. The relocation site would, as for as possible, contain the access to facilities and services better than or at least equivalent to the one lost and provided with tenure security. In case of land-for-land for affected agricultural land, the replacement land should be of better or at least equivalent productive capacity at location acceptable to the PAP.

5. PAPs entitled for relocation will be provided transport allowance or full assistance for transportation, and re-establishment of their house or business structures.

6. All severely affected and displaced PAPs will be entitled to a transition allowances for a period based on the monthly incomes/wages of affected PAPs.

7. Except for the long-term income rehabilitation assistance, payment of compensation and other allowances, and relocation assistance for a project component, phase or part thereof, will be completed prior to award of civil works contracts and before possession is taken of the assets.

In case of other unforeseen impacts not covered above, appropriate measures would be determined keeping in mind the overall objective of this policy.

6.2 Entitlements

1. Entitlements for compensation and rehabilitation assistance to different categories of PAPs are described in the following sub-sections and presented in the Entitlement Matrix in Table 6.1 of this SIMF. Entitlement packages will be classified in terms of category of loss rather than category of person affected as each category of person may suffer more than one loss.

A. PAPs losing Agricultural Land

(a) When the portion of the irrigated agricultural and *barani* land to be lost and the remaining land is economically viable and more than half a acre, cash compensation at full replacement value, will be provided to the PAP. Where significantly large or entire land holding is affected by the project, the general mechanism for compensation of lost agricultural land will be through provision of "land for land" arrangements of equivalent productivity and at location acceptable to the PAP. In case suitable replacement land is not available, at the PAPs request cash compensation at replacement cost will be provided. In cases where only partial land is affected but the remaining land becomes economically unviable, or less than half a acre, the PAP will be entitled to compensation for entire holding at full replacement value or land-for-land option.
(b) The replacement agricultural land will be provided to the PAP free of any tax, transfer costs, registration fee or charges.
(c) PAPs whose land is temporarily taken by the works under the Project will be compensated at replacement cost for their net loss of income, damaged assets, crops and trees, as the case may be.
(d) Affected tenants and leaseholders on the agricultural land will be compensated for the market value of the gross harvest for one year's production or the remaining period of the tenancy agreement/lease, whichever is greater.
(e) Affected agriculture labor will be compensated for the loss of income and will be paid compensation equivalent to the three months salary and assisted in getting alternative employment.
(f) Squatters and encroachers will not be entitled to compensation for affected land.

B. PAPs losing Residential or Commercial Land
(a) Where the portion of the land is affected and the remaining land is aconomically viable for continued use, PAPs will be entitled to cash compensation at full replacement value for the affected portion of the holding. Where significantly large or entire land-holding is affected by the project, the general mechanism for compensation of lost land will be through provision of "land for land" arrangements of equal size and at location acceptable to the PAP. In case, suitable land is not available, cash compensation at replacement cost will be provided. However, where only partial land is affected but the remaining land becomes either unviable or in area less than the minimum required under the prevailing zoning laws, the PAP will be entitled to compensation for entire holding at full replacement value, or land-for-land option. In case of loss of business premises, PAPs be entitled to alternative business site of equal size and location with good accessibility to customers and satisfactory to the PAP, or cash compensation at full replacement value, if suitable replacement land is not available.
(b) The replacement land will be provided to the PAP free of any tax, transfer costs, registration fee or charges at the time of transfer.
(c) Squatters and encroachers will not be entitled to compensation for affected land;
(d) Affected tenants and leaseholders on the commercial/residential land will be compensated in cash equivalent to the three months of rent or the remaining period of the tenancy/lease agreement, whichever is greater.
(e) PAPs, whose land is temporarily taken by the works under the Project, will be compensated at replacement cost for their net loss of income and damaged assets, as the case may be.

C. Loss of *Shamilat* (common) Land
(a) It is not expected that *shamilat* land will be affected by the project. However, in case it is affected, PAPs will be entitled to cash compensation in proportion to their ownership share.

D. PAPs losing Houses/Structures

(a) The mechanism for compensating loss of residential and other structures will be cash compensation reflecting full replacement cost of the structures, without depreciation.
(b) If the house or structure is only partially being affected by the Project, the PAP will be entitled to cash compensation for the affected portion of the structure and a repair allowance (minimum of 20% of compensation) for restoration of the remaining structure for its continued use. However, if the remaining structure is rendered unviable or in area less than the minimum house size under the prevailing zoning laws, the PAP will be entitled to compensation for entire structure at full replacement cost without depreciation.
(c) Tenants, who have leased a house / structures for residential or other purposes and affected by the project, will be provided with a cash grant equivalent to three months rental allowance, and will be assisted in identifying alternative rental accommodation.
(d) Affected households will also be entitled to a transfer/shifting allowance; and a transition allowance for three months.
(e) Affected squatters will be compensated at replacement cost and provided relocation assistance.

E. Loss of Business/Income or employment

Affected PAPs would be provided with opportunities for employment in reconstructed business enterprise. Alternatively, income rehabilitation package would be provided to the PAPs for re-employment, training in other trades and skills, agricultural inputs and extension services support, or for starting a new business depending upon their needs and priorities. The type and level of assistance required will be decided in consultation with the PAPs.

F. Loss of standing crops and trees:

PAPs will be entitled to cash compensation equivalent to market value of crops and trees based on the type, age and productive value of affected trees.

G. Loss of Public Infrastructure

(a) Public infrastructure facilities will be replaced by the implementing agency before the old facilities are demolished. This category includes roads, water tanks, schools, clinics, power and communication lines, sewer lines and public buildings such as schools and clinics.
(b) The implementing agency will deal with the owners of the Public Infrastructure facility which is being disturbed as a result of the project construction. This replacement will be according to the same design and specification as the existing one.

7. IMPLEMENTATION ARRANGEMENTS

7.1 Preliminary Screening

1. During the identification and preliminary stages of sub-project preparation, SIDA will undertake a preliminary Social Assessment to identify the types, degree and scale of potential social impacts of the sub-project. To correctly identify the relevant social issues and to assess the type and level of information required during subsequent field investigations, particular attention will be paid to adverse impacts to the affected community, such as loss of land and other fixed assets and the number of persons marginally or severely affected and the types of vulnerable groups affected. The information collected during the preliminary social assessment will provide the basis for determining severity of impacts and the level and depth of subsequent field surveys, investigations and documentation (for social screening criteria see Attachment 1: Preliminary Social Assessment).

2. In the case of main canals, distributary and minors, if preliminary assessment indicates that the potential impact of the proposed sub-project will be significant, detailed social assessment would be conducted, consultation with key stakeholders would be carried out and appropriate safeguard documents prepared. Where social impacts are limited and generally confined the loss of assets and incomes due to land take preparation of resettlement plan would be sufficient. However, where the social risks and impacts are severe and beyond the scope of resettlement plan, additional mitigation plans may be necessary. The procedure for assessment of impacts and preparation of mitigation plans is outlined below.

7.2 Categorization

1. Large scale population displacement (physical/economic) is not likely under the sub-projects. It is possible that people could be affected by sub-projects involving small scale land acquisition for canal rehabilitation or other construction activities or their assets including crops, trees or structures may be affected. The requirement of land for these infrastructure facilities, however, is small. Hence, the population displacement would also be in that order. The individual sub-project design reports would include detailed assessment of impacts and appropriate documents for mitigation of impacts depending upon the scale and degree of impacts. The categorization of the sub-projects would be based on the number of the affected people.

The likely sub-projects would be categorized to facilitate speedy screening, appraisal, approval and implementation. The criteria for categorisation would include the following:

Table 7.1 : CATEGORIZATION OF SUB-PROJECTS BASED ON SOCIAL SENSITIVITY

Category	Description		Type of project
	Level of issues	**Management measures**	
S-1	serious social issues expected	project specific Social Assessment Report (SAR) along with a RP is essential	200 or more PAPs are affected
S-2	moderate social issues expected	adopt generic design guidelines and norms in SIMF along with a project specific SAR and abbreviated resettlement plan essential	< 200 PAPs are affected
S-3	no social issues expected hence socially benign	no social mitigation measures required, need to submit Social Assessment Report	No PAPs are affected

7.3 Social Assessment and Field Surveys

1. **Social Assessment.** SIDA will be responsible for carrying out all necessary surveys, field studies and investigations, as identified during the screening and for conducting *Social Assessment*, where necessary. Prior to undertaking the surveys SIDA will conduct a public information campaign to describe the project components, types of impacts, content and schedule for the census and inventory or other background surveys to the key stakeholders. In addition to the identification of potential social risks and impacts including gender issues, social assessment would also include stakeholder and institutional analyses. Where social risks and impacts are significant and go beyond those caused by land acquisition, preparation of S*ocial Action Plan* will be necessary to mitigate adverse social impacts and to maximize benefits to target population.

2. **Surveys for RP**. Where in sub-projects, social assessment identifies need for land acquisition and potential impacts on private assets with consequent loss of employment and livelihood; additional surveys would be necessary for preparation of R*esettlement Plans*. These would include: a census; an inventory of affected assets and other losses; and a socio-economic baseline survey. The census and the inventory of affected assets will cover all PAPs, regardless of entitlement or land ownership. Criteria for vulnerability of PAPs should be paid particular attention in order to provide additional assistance. Baseline survey should cover at least 30% of severely affected/displaced PAPs and would include information on socioeconomic characteristics of potentially affected households. The baseline data would be used for post-implementation evaluation to determine whether or not affected peoples have been able to restore their livelihood.

3. **Census, inventory and baseline surveys** would be conducted when detailed engineering designs with the alignments of drains (or canals) are available, and the exact land acquisition requirements can be determined. The census will draw on a combination of engineering designs, land revenue records and maps, supported by field verification. The implementing entity or a qualified consultant experienced in field surveys will be assigned to conduct this census. The Land Acquisition Collector will be involved at every stage of the study and the data will be authenticated by the Collector. It is recommended that field surveys and investigations for census, inventory of assets and baseline data are carried out in an integrated manner to maximize use of available resources and to avoid repeated field visits.

4. The purpose of the census will be to generate baseline data for:

(a) a list of 100% of the PAPs and their property losses, which will furnish the basic data for planning of mitigation measures as well as the baseline for monitoring of implementation by the Project Land Acquisition Office (PLAO), as well as by the independent monitoring agency to be appointed to the project; and
(b) establishment of an electronic PAP Database which will serve as the principal monitoring instrument to record progress on compensation payments for assets lost, and provision of economic rehabilitation assistance.

5. A standard census format will be used for preparation of RPs in all WSIP sub-projects with land acquisition. The census data will be entered into an electronic, menu driven PAP Database. The database will be regularly updated with monitoring information on acquisition of assets, compensation payments, and economic rehabilitation assistance. [8]

7.4 Documentation

[8] An electronic database of project Affected Persons comprising a baseline record of landholdings and types of losses, together with data on asset valuation and compensation payments was established for the IDA supported Fordwah Eastern Sadqia (South) Drainage and Irrigation Project (Cr. 2410-PAK) (FESS). A menu driven database using Access together with a user manual was developed for the FESS database. WSIP sub-projects with land acquisition should draw on this database format and program as a model.

7.4.1 Detailed Resettlement Plan (RP)

1. In cases where the project affects and/or displaces more than 200 people (40-50 families), a time-bound Resettlement Plan (RP) for the sub-project will be prepared in sufficient details depending upon the degree and scale of impacts in a project. For the RP preparation process to begin, the exact ground locations of the required lands and right of way of the irrigation and drainage canals and other structures are to be identified first and demarcated. As such, the social safeguard and the engineering consultants jointly with SIDA will carry out detailed engineering surveys and design the rehabilitation and improvement works and lay them on the available land ownership maps. With the acquisition locations demarcated on the ground, work on the major process tasks, such as social screening and PAP census, will begin to generate the RP inputs. The RPs will describe distinctly and clearly how the sub-project would improve, or at least restore economic livelihoods of PAPs through adequate asset compensation and economic rehabilitation measures. The RP for sub-projects would comprise implementation and staffing arrangements, grievance redress, arrangements for consultation with PAPs, baseline census data on PAPs, monitoring, and a time-bound implementation plan and budget.[9] The RP for any given sub-project would be submitted to IDA for a review at least 3 months before the proposed date of initiation of land acquisition and resettlement and 6 months before the commencement of the associated construction activity.

2. Resettlement plans should be built around a development strategy, and compensation, resettlement, and rehabilitation packages should be designed to improve or at least restore the social and economic base of those severely affected. Preference should be given to resettling vulnerable people dislocated from their existing settings by providing opportunities for sustainable income generation in similar settings. Where a project is likely to adversely affect households belonging to poverty groups, the resettlement plans should specify measures, additional to the compensation entitlements, aimed to improve status of the poor to bring them up to an acceptable level above the poverty line.

7.4.2 Abbreviated (Summary) Resettlement Plan:

1. In cases where the impacts of the sub-project are marginal such that less than 200 persons (about 40-50 families) are affected without any large scale displacement, or where the impacts are minor, although more than 200 persons may be affected, a simple RP should be prepared. It should provide general information of the project, social impacts and the number of people affected, entitlements for compensation and other assistance for each category of PAPs, estimated cost, and implementation schedule.

7.5 Procedures for Land Acquisition.

Land acquisition for drainage will produce both winners and losers. Where production increases on the remaining land is higher than or equal to the pre-project production on the land lost, incomes have been restored, and the livelihood and earning capacity of the PAP is improved or restored. At the same time, there will also be farmers who, in spite of production increases on their remaining land as a result of improved drainage, will have suffered a decline in income as a result of land acquisition. In addition, there will be farmers who lose land to drains without drainage benefits. These farmers, whether land owners or tenants, will be entitled to economic rehabilitation assistance. Census of PAPs would identify those adversely affected by the project activities and help in designing appropriate economic rehabilitation measures. These measures would be in addition to any accrued or perceived benefits due to the project activities. Procedures for acquisition of land in sub-projects would include the following:

7.5.1 Direct Purchase at Market Price

[9] For sub-projects in which less than 200 persons are affected by acquisition of land or other assets, mitigation measures need to be planned for. These measures should be based on a complete census of PAPs, a mitigation plan comprising appropriate compensation for assets lost, a relocation grant and logistical support for moving, and, if necessary, economic rehabilitation assistance would be the only requirements. The principles on which compensation is provided would be the same as for larger groups. Only an abbreviated (short) RP would need to be prepared and submitted to IDA for review prior to award of contracts for any civil works.

1. Where possible and permitted by regulations, the required land for sub-projects will be acquired by implementing agencies through direct purchase based on 'willing buyer willing seller' principle, as the first option and following due care to ensure that the negotiations are held in a transparent manner in the presence of NGOs and PAPs' representatives.

2. To ensure that the negotiated prices reflect current market rates, 'Bench Mark' market rates for each mauza would be established by the LVC, prior to start up of negotiations with the PAPs as a low profile exercise and the information will be used to monitor how the final rates are agreed upon. If the negotiated rate is less than the bench mark rate by 15% or less, the 'negotiations' would not be considered automatically as free and transparent. In such cases, the market rates determined by LVC would be taken as a basis for renegotiation or acceptance of the transaction.

3. All proceedings will be documented and final agreement would be signed by the negotiating parties.

7.5.2 Voluntary donations of land

Where possible and in consultation with affected communities, private land may be obtained through voluntary donation by the affected households. Voluntary donation of land by beneficiary households would be acceptable where:

- ③ The impacts are marginal (based on percentage of loss and minimum size of remaining assets);
- ③ Impacts do not result in displacement of households or cause loss of household's incomes and livelihood;
- ③ The households making voluntary donations are direct beneficiary of the project;
- ③ Land thus donated is free from any dispute on ownership or any other encumbrances;
- ③ Consultations with the affected households is conducted in a free and transparent manner;
- ③ Land transactions are supported by transfer of titles; and
- ③ Proper documentation of consultation meetings, grievances and actions taken to address such grievances is maintained.

7.5.3 Acquisition under the Land Acquisition Act

Where direct purchase by implementing agencies is not materialized, acquisition of required land and other assets would be carried out following the procedures under the Land Acquisition Act 1894 and provisions of this SIMF regarding compensation, rehabilitation and other assistance.

7.6 Asset Valuation

1. In the village context, different factors make estimation of market prices to determine replacement costs for land and other fixed assets difficult. There is no open land market which enables identification of 'market prices', since co-villagers hold residual land rights which discourage or prevent land sales to outsiders and tend to lower transaction prices. At the same time, where land is bought and sold, farmers will report a lower land price than the actual amount paid to reduce payment of taxes on land sales, and this will be reflected in the revenue records.

2. Compensation at Replacement Cost. In case direct purchase of required land by the project authorities is not possible, all acquisition of land would be acquired under the Land Acquisition Act 1894, and following the provisions of this policy framework which provides compensation for properties to be acquired and support to be extended for meeting replacement value of the property. Premium on assessed values, as provided for in Section 23 of the Act, do not fully meet replacement cost. Where the compensation provided under the Land Acquisition Act (market rates+15% for compulsory acquisition) is lower than the replacement cost, additional top-up amount would be provided to meet the above requirement of the SIMF.

3. To arrive at land compensation rates which constitute a realistic approximation to replacement costs, Land Valuation Committees (LVC) will be formed for sub-projects to provide guidance regarding fair valuation of the affected property. LVCs will have a total of five members as follows: Assistant Commissioner of Revenue from the respective subdivision (Chair), Land Acquisition Collector, a representative of the project implementing agency, and two PAPs from the affected locality. The LVC will have an advisory role. It will review the land valuation rates before finalization of a RP for a particular sub-project. Its opinions will be annexed to the RP.

4. Replacement cost for structures would be determined based on the area, construction material and labor costs at current market rates. Compensation for affected crops and trees would be determined based on the guidelines provided by the relevant agencies. For perennial trees, compensation would be based on the type, age and productive value of affected trees.

8. PUBLIC CONSULTATION AND PARTICIPATION

1. The project will aim to addressing stakeholders legitimate concerns while paying special attention to project affected persons. Providing opportunities and avenues for informed stakeholder consultation, and, where appropriate, their participation in decision-making in project preparation, implementation and evaluation, in order to foster greater ownership and sustainability. The endeavor would be to involve all stakeholders in the complete project life cycle. This endeavor is extended to all community development activities of the project involving all categories of stakeholders.

2. Preparation of appropriate documents and planning and implementation for the acquisition of land and other assets will be carried out in consultation with the PAPs. Particular attention would be paid to the vulnerable groups, including those without tenure security, to ensure that their concerns are adequately addressed during the project design. The PAPs will receive prior information of the compensation, relocation and other assistance available to them.

- The relevant details of the project;
- The resettlement plan and various degrees of project impact;
- Details of entitlements under the resettlement plan and what is required of PAPs in order to claim their entitlements (a copy of the entitlement matrix should be provided to the PAPs);
- Compensation process and compensation rates;
- Relocation and resettlement site development operation in order to obtain agreement and support of affected people in participating in these operations; and
- Implementation schedule with a timetable for the delivery of entitlements.

3. PAPs will be notified of the project impact on their possessions immediately after the census, during the valuation of their property by the LVC. For effective implementation of land acquisition and resettlement, it is essential that the entitlements are awarded on an equitable, transparent and timely basis. These issues will be addressed by comprehensive information campaigns in the project area at scheduled times to advise the PAPs of their entitlements and plan for their award

9. GRIEVANCE REDRESS MECHANISM

1. SIDA project level staff will make all efforts to address grievances at the sub-project level.

2. To assist PAPs with claims regarding compensation and eligibility, which cannot be resolved at the sub-project level, a Grievance Redress Committee (GRC) will be established by the AWB/PIDA at the sub-project level. The GRC will be composed of a representative of the Assistant Commissioner office, the Project Director of the concerned sub-project, the Land Acquisition Collector, Social Scientist of the Land Acquisition & Resettlement Unit, one local dignitaries, and two representatives of the PAPs from the sub-project area.

2. GRC will meet once a quarter to consider outstanding grievances. The objective of the GRC will be to arrive at mutually acceptable solutions to grievances through free and open discussions. Should PAPs still be dissatisfied they may appeal to a court of law as provided for the LA Act of 1894.

3. Grievance redress arrangements should be disseminated to the PAPs with clear information on where and how grievances can be submitted, as well as the process for grievance redress, both at the sub-project level and through the court system.

4. All grievances submitted by PAPs will be recorded in the electronic PAP database together with the date they were processed and the decision taken by the GRC.

5. The project will bear all expenses incurred by complainants in regard to grievance redress.

10. IMPLEMENTATION SET-UP AND STAFFING

10.1 Staffing of Environment and Social Units

1. Both SIDA and the AWBs need to be staffed with adequately trained personnel to deal with social impact issues, including land acquisition and resettlement. Staffing for preparation and/or implementation is required at three levels, namely SIDA, the AWBs, and at the level of specific sub-projects with significant land acquisition whether sponsored by the SIDAs or the AWBs.

2. To enable implementation of sub-projects with land acquisition by SIDA, its Environment and Social Unit will have to be strengthened with adequate professional and support staff to permit it to (i) manage RP preparation by consultants for sub-projects sponsored by SIDA, (ii) monitor RP implementation in sub-projects sponsored by SIDA, and (iii) produce consolidated progress reports on RP implementation for the Project Director. At the SIDA level, the proposed Environment and Social Unit will be able to handle tasks related to both FO formation and land acquisition, whereas the scale of these tasks at the AWB level require that they are handled by separate cells.

3. The AWBs will need staff to (i) manage social impact assessment and management, including necessary surveys and documentation, by consultants for sub-projects under the WSIP, (ii) implement social mitigation plans, including RPs, for projects with minor land acquisition, and (iii) monitor RP implementation and report on progress to the WSIP Director.

4. For sub-projects sponsored by SIDA, and for those with significant social impacts and land acquisition sponsored by the AWBs, the organizational set-up for project implementation will require a unit at the project site to manage social issues and RP implementation. The unit would be required for

the duration of RP implementation. This unit would undertake the following tasks (i) support the consultant engaged for social screening and assessment, RP preparation and collection of data for the PP baseline census, (ii) implement the RP (including information and consultation, verification of asset valuation, facilitation of compensation payments, and economic rehabilitation measures), (iii) undertake supplementary surveys as required, and (iv) maintain and update a PAP monitoring database.

11. MONITORING AND EVALUATION

1. Implementation of the Social Action Plans and Resettlement Plans will be regularly supervised and monitored by the social specialist of the Environment and Social Unit of SIDA. The findings will be recorded in the monthly progress reports to be furnished to the Project Director and the Bank.

2. Internal monitoring and supervision will:

(a) Verify that the baseline information of all PAPs has been carried out and that the valuation of assets lost or damaged, and the provision of compensation, resettlement and other rehabilitation entitlements has been carried out in accordance with the provisions of this SIMF and the respective RP for sub-projects.

(b) Oversee that the RPs are implemented as designed and approved.

(c) Verify that funds for implementing the RPs are provided by the project developers in a timely manner and in amounts sufficient for their purposes, and that such funds are used in accordance with the provisions of the RP.

12. FINANCING

1. The cost of the acquisition of land and other assets will be paid by the respective executing agencies (either SIDA, WAPDA or PIDAs). Where assets will be acquired under the LA Act, the funds for compensation payments will be placed at the disposal of the Land Acquisition Collector (LAC) who will disburse it to the PAPs. Social staff of the environment and Social Unit of SIDA will coordinate the disbursements. The budgeted funds will be made available for disbursement at scheduled dates. Some of resettlement costs and particularly the cost of relocation of vulnerable groups and economic rehabilitation activities for PAPs who lose income as a result of land acquisition can be funded out of the IDA credit.

Table 6.1 Entitlement Matrix

No.	TYPE OF LOSS	APPLICATION	DEFINITION OF ENTITLED PERSON	ENTITLEMENT POLICY
1	2	3	4	5
1	Loss of agriculture land	Partial loss of land holding and the remaining holding economically viable and at least equal to or more than 0.5 acres (marginal impact on household income and living standards).	a) Legal owner with valid title or customary or usufruct rights.	PAPs will be entitled to: – Cash compensation for acquired land at replacement value.
			b) Tenant, leaseholder and sharecropper	PAPs will be entitled to: – Compensation in cash for lost income for the remaining period of lease
			c) PAPs without valid title (encroachers, squatters)	PAPs will be entitled to: - Vulnerable squatters will be entitled to assistance for loss of income Encroachers will not be entitled to any compensation or assistance.
		Loss of entire land holding lost, or where partial loss but the remaining land is less than 0.5 acre or is rendered economically unviable. (severe impact on household income and living standards)	a) Legal owner with valid title or customary or usufruct rights.	PAPs will be entitled to: – Equivalent area of land with equivalent productive potential at location acceptable to PAP, or – Cash compensation for acquired land at replacement value at informed request of the PAP and cash assistance for land preparation – Transition allowance for a period of three months
			b) Tenant, leaseholder and sharecropper	PAPs will be entitled to: – Cash compensation equivalent to market value of gross harvest for one year production or for the remaining period of tenancy/lease, whichever is greater Affected labor will be compensated for loss of income equivalent to three months of wages.
			c) PAPs without valid title (encroachers, squatters)	PAPs will be entitled to: - Vulnerable squatters will be provided assistance for loss of livelihood and incomes. - Compensation at replacement cost for loss of affected structures. Encroachers will not be entitled to any compensation or assistance.
2	Loss of residential, commercial, industrial or institutional land	Partial loss of residential, commercial, industrial or institutional land with remaining land sufficient to reorganize	a) PAPs with valid title or customary and usufruct right.	PAPs will be entitled to the following: - Cash compensation for affected portion of the land at replacement value.
			b) PAPs such as tenants and leaseholders	PAPs will be entitled to the following: – Reimbursement for loss of income for the un-expired lease period

			c) PAPs without title (squatters and encroachers)	PAPs will be entitled to the following: – Vulnerable squatters will receive a transitional allowance equivalent to two months' income (in case of impact on income or livelihood). – Cash compensation for affected structures at replacement cost Encroachers will not be entitled to compensation or assistance.
		Loss of residential, commercial, industrial or institutional land without sufficient remaining land. PAPs will be required to relocate	a) PAPs with valid title or customary and usufruct right.	PAPs will be entitled to the following: – An equivalent area of land of similar characteristics and access to facilities in an acceptable location, or – Cash compensation for the entire land holding at replacement value
			b) PAPs such as tenants and leaseholders	PAPs will be entitled to the following: – An equivalent area of leased land for un-expired lease period or – Reimbursement for un-expired lease period
			c) PAPs without title (squatters and encroachers)	PAPs will be entitled to the following: – Cash compensation for affected structure at replacement value (For Vulnerable squatters only). Encroachers will not be entitled to land compensation.
3	Structures (Residential, commercial, industrial or institutional)	Partial loss of structure and the remaining structure viable for continued use.	a) Legal owner of the affected structure with valid title or customary or usufruct rights.	PAPs will be entitled to the following: - Cash compensation for affected part of the structure at replacement value; and - Allowance to cover repair cost of the remaining structure.
			b) Owner of affected structure without title to the land (squatter / encroacher)	PAPs will be entitled to the following: - Cash compensation for affected part of the structure at replacement value; and - Allowance to cover repair of the remaining structure.
		Entire loss of structures or where only partial impact, but the remaining structure is rendered unviable for continued use, and sufficient land for reorganization.	a) Legal owner of the affected structure with valid title or customary or usufruct rights	PAPs will be entitled to the following: - Structure of equivalent standard in an acceptable location or - Cash compensation for entire structure at replacement value - Transport allowance for shifting to new location
			b) Owner of affected structure without title (squatter / encroacher)	PAPs will be entitled to the following: - Cash compensation for entire structure at replacement value - Transport allowance to new location
			c) Tenant / leaseholder in the partially affected structure	PAPs, if displaced, will be entitled to the following: - Transition allowance equivalent to three months' rent - Transport allowance for shifting to new location
4	Loss of trade / livelihood / occupation or business incomes	Agricultural / industrial / commercial or institutional wage employment impacts	Individuals	PAPs will be entitled to the following: - Employment in reconstructed enterprise or package for re-employment or starting a business - Transition allowance equivalent to three months incomes / wages in case of

				permanent closure. - In case of temporary closure, compensation will be wages equivalent to closure period.
5	Loss of access to common resources and facilities	Loss of access to rural common property resources and urban civic amenities	Communities / Households	PAPs will be entitled to the following: - Replacement of common property resources / amenities. - Access to equivalent amenities / services.
6	Loss of standing crops	Standing Crops that could not be harvested	Owner of affected crops	PAPs will be entitled to cash compensation equivalent to market value of damaged crops.
7	Loss of perennial plants & trees	Affected Plants and trees	Owner of affected plants and trees	PAPs will be entitled to cash compensation equivalent to market value on the basis of type, age & productive value.
8	Loss of public infrastructure	Infrastructure (electric water supply, sewerage & telephone lines; public health center; public water tanks)	Relevant agencies.	Compensation in cash at replacement cost to respective agencies.
9	Losses to host communities	Affected amenities and services	Relevant community	Restore losses as a result of resettlement for amenities / services equivalent to those provided to PAPs.
10	Temporary Losses	Affected structures or other fixed assets	Affected PAPs	In cash, on the basis of replacement cost of material and labor without deduction for depreciation or salvageable materials for the damages during the period of temporary possession.
		Severely affected structures	Affected PAPs made to shift temporarily from their present location	Entitlement will be in terms of rent allowance to cover the cost of alternate accommodation for the period of temporary displacement.
		Loss of crops and trees	Affected PAPs	compensation at market value and for loss of net income from subsequent crops that cannot be planted for the duration of temporary possession
		Temporary acquisition	Affected PAPs	No compensation for land if returned to the original user, but a monthly rent as per market value will be paid to PAPs. PAPs will be compensated immediately and damaged assets will be restored to its former condition.

Attachment 1

Preliminary Social Impact Assessment[10] (Generic)

Sub-Project:_____

Location: _____

Estimated Number of Project Affected Persons[11] (PAPs):_____
Types of Impacts (Social and Economic Risks)[12]:

Social Impacts	Yes / No / Likely/ Not applicable	Where possible, provide details (Expected number of households, area of land, types of structures likely to be affected)
Is land acquisition necessary[13]		
Presence of squatters		
Loss of structures resulting in displacement		
Displacement of people due to loss of productive assets		
People losing means of livelihood and incomes (Temp. / Permanent)		
Is there any risk of economic marginalization of farmers and smallholders		
Basic facilities / services will be inaccessible (Temp. / Permanent)		
Impact on crops, trees and other fixed assets in terms of loss of production or drop in yields		
Tenants/Lessees losing any fixed assets		
Loss of community assets		
Loss of existing social & community ties		

[10] Information for SA should be collected in consultation and coordination with local authorities, local NGOs and community leaders of affected community. Where possible, sufficient time should be spent for group discussions with community likely to be affected by the project.
[11] The number of people likely to be affected should be based on rapid assessment
[12] It may not always be possible to get information on some of the above impacts at the preliminary social assessmrnt stage. However, particular attention should be paid to these types of impacts during the project preparation stage.
[13] Provide location map indicating project area boundary, total area, access, use of adjoining land etc.

Impacts on Vulnerable Groups, if any:

Types	Yes / No / Likely/ Not applicable	Remarks (Where possible, provide estimated number of households & persons)
Poverty group affected		
Women headed households affected		
Ethnic Minority Affected		
Other vulnerable groups[14] affected		
Is there any risk to smallholders in terms of loss of livelihoods		

[14] This may include disabled, child labor, bonded labor, farm labor, etc.