

The Inspection Panel

Investigation Report

Pakistan – National Drainage Program Project
(Credit No. 2999-PAK)

July 6, 2006

About the Panel

The Inspection Panel was created in September 1993 by the Board of Executive Directors of the World Bank to serve as an independent mechanism to ensure accountability in Bank operations with respect to its policies and procedures. The Inspection Panel is an instrument for groups of two or more private citizens who believe that they or their interests have been or could be harmed by Bank-financed activities to present their concerns through a Request for Inspection. In short, the Panel provides a link between the Bank and the people who are likely to be affected by the projects it finances.

Members of the Panel are selected “*on the basis of their ability to deal thoroughly and fairly with the request brought to them, their integrity and their independence from the Bank’s Management, and their exposure to developmental issues and to living conditions in developing countries.*”¹ The three-member Panel is empowered, subject to Board approval, to investigate problems that are alleged to have arisen as a result of the Bank having ignored its own operating policies and procedures.

Processing of Requests

After the Panel receives a Request for Inspection it is processed as follows:

- The Panel decides whether the Request is prima facie not barred from Panel consideration.
- The Panel registers the Request—a purely administrative procedure.
- The Panel sends the Request to Bank Management, which has 21 working days to respond to the allegations of the Requesters.
- The Panel then conducts a short 21 working-day assessment to determine the eligibility of the Requesters and the Request.
- If the Panel does not recommend an investigation, and the Board of Executive Directors accepts that recommendation, the case is considered closed. The Board, however, may approve an investigation against the Panel’s recommendation if it so warrants.
- Three days after the Board decides on whether or not an investigation should be carried out, the Panel’s Report (including the Request for Inspection and Management’s Response) is publicly available through the Panel’s website and Secretariat, the Bank’s Info Shop and the respective Bank Country Office.
- If the Panel recommends an investigation, and the Board approves it, the Panel undertakes a full investigation, which is not time-bound.

¹ IBRD Resolution No. 93-10; IDA Resolution No. 93-6.

- When the Panel completes an investigation, it sends its findings and conclusions on the matters alleged in the Request for Inspection to the Board as well as to Bank Management.
- The Bank Management then has six weeks to submit its recommendations to the Board on what actions the Bank would take in response to the Panel's findings and conclusions.
- The Board then takes the final decision on what should be done based on the Panel's findings and the Bank Management's recommendations.
- Three days after the Board's decision, the Panel's Report and Management's Recommendation are publicly available through the Panel's website and Secretariat, the Bank's Info Shop and the respective Bank Country Office.

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Map No. IBRD 33665R

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Acronyms, Units and Currencies

ADB	Asian Development Bank
AWB	Area Water Boards
BP	Bank Procedures
DPOD	Dhoro Puran Outfall Drain
DMP	Drainage Master Plan
DSEA	Drainage Sector Environmental Assessment
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
FLAR	Framework for Land Acquisition and Resettlement
FO	Farmer Organization
GoP	Government of Pakistan
GoS	Government of Sindh
IBIS	Indus Basin Irrigation System
IDA	International Development Association
JRM	Joint Review Mission
KPOD	Kadhan Pateji Outfall Drain
LBOD	Left Bank Outfall Drain
NDP	National Drainage Program
NSDS	National Surface Drainage System
NGO	Non-Governmental Organization
NIO	National Institute of Oceanography
O&M	Operation and Maintenance
OD	Operational Directive
OP	Operational Policy
PIDA	Provincial Irrigation and Drainage Authority
PoE	Panel of Experts
RAP	Resettlement Action Plan
RBOD	Right Bank Outfall Drain
SAR	Staff Appraisal Report
SCARP	Salinity Control and Reclamation Project
SMO	SCARP Monitoring Organization
TBOD	Trans-Basin Outfall Drain
WAPDA	Water and Power Development Authority

Units and Currencies

cfs	cubic foot per second
bm ³	billion cubic meters
dS/m	deci Siemens per meter
ETM+	enhanced thematic mapper
ft	foot
ha	hectar
km	kilometer
m ²	square meter
mm	millimeter
m ³ /s	cubic meter per second
RGB	red/green/blue – spectral bands used in satellite images

Rs.	Pakistani Rupee
ppm	part per million
RD	Reduced Distance (1RD = 1000 feet)
SDR	Special Drawing Right
TM	thematic mapper
US\$	United States Dollar

Executive Summary

Introduction

On September 10, 2004, the Inspection Panel received a Request for Inspection (the “Request”) related to the Pakistan: National Drainage Program Project (the “NDP Project” or the “Project”). The NDP Project was launched in 1997, and is partly financed under IDA Credit No. 2999-PAK. The Credit financing the NDP Project was approved on November 4, 1997.

The NDP Project originally was aimed at implementing the first phase of the Borrower’s and Provinces’ twenty-five year NDP Framework Program through a combination of infrastructure investment, institutional reform, research and sector planning. The Project was designed to address the problems of waterlogging and salinity in the Indus Basin, identified as principal threats to the sustainability of irrigated agriculture in Pakistan. The Project set out to lay the basis for long-term solutions to these problems, including (originally) the groundwork for construction of a major northward extension of the Left Bank Outfall Drain (LBOD),² known as the National Surface Drainage System (NSDS). The NDP Project included, among other things, completion of the LBOD as part of its pipeline of investments. The Project was approved with an estimated cost US\$785 million.

During implementation, the NDP Project’s planned investment actions were scaled-back significantly. The Project supported the development of a new Drainage Master Plan (DMP), which contains significant new proposals and approaches for drainage and drainage management. The Project did not implement the originally envisaged NSDS.

The Requesters and the Substance of their Claims

The Request was submitted by Khadim Talpur, Mohammad Ali Shah, Mustafa Talpur, Munawar Hassan Memon, Iqbal Hyder, Mir Mohammad Buledi, and Najma Junejo on their own behalf and on behalf of *“others who live in the area known as district Badin, Sindh, Pakistan”* in the Indus River Basin. The Request raises issues related, in particular, to the disposal of saline effluent and to the proposed construction of the NSDS under the original NDP Project design. The Requesters claim that the Bank has violated its own operational policies and procedures, resulting in harm and likely harm to locally affected people, communities, and the natural environment.

Environmental Assessment. The Requesters state that the design of the NDP Project is faulty and unsustainable because it has not taken into account the social and environmental difficulties inherent in the existing disposal route, and because it did not explore possible alternative routes. They claim that the proposed drainage network *“will badly affect the already degraded environment of Indus Delta.”* They further claim that the environmental assessment (EA) ignored or underestimated the Project’s negative impacts on marine

² The LBOD was originally financed under the Credit related to the LBOD Project approved by IDA’s Board of Executive Directors in 1984 and closed on December 31, 1997. The LBOD system consists of a “Spinal Drain” and related structures that drain irrigation and agriculture effluent from the north to the sea, through lands inhabited by Requesters. The final 26-mile connection to the sea is known as the Tidal Link.

resources, biodiversity, local ecology, critical habitats and protected areas. The Request maintains that the EA “*lacked legitimacy*” because no consultation with civil society and NGOs took place during its preparation. The Requesters further claim that, in violation of Bank policy, there is no Environmental Management Plan (EMP) for the NDP Project, and the implementation of EMP for the LBOD is long delayed.

Natural Habitats. The Requesters state that the Project adversely affects the wetlands and interconnected lakes known as dhands, which are the source of livelihood for forty villages of fishermen with a combined population of 12,000 to 15,000 people. They state that the Project links drainage systems to the Tidal Link, which passes through two dhands, the Nurri Lagoon and the Jubho Lagoon. These lagoons are sites included under the 1971 Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention) to which Pakistan is a Party. The Requesters state that this linkage is “*entirely unsound*” because the construction of the Tidal Link prevented the water from the Rann of Kutch (also referred to as the Runn of Kutch) from entering the dhands during wet years, thus reducing the areas of these dhands and forcing people to migrate elsewhere.

Indigenous Peoples. The Requesters claim that the Project adversely affects people from the *Mallah* tribe of the coastal belt. They also state that the existing faulty operation of the LBOD has already led to the inundation of the *Mallah* villages, causing loss of life and livelihood, including fish catch on which the *Mallah* communities depend for income and sustenance. They further claim that the Project did not take into account the poverty of the indigenous people and will pose a serious threat to the lives, livelihoods and rights to development and culture of indigenous groups.

Involuntary Resettlement and Loss of Livelihood. The Requesters state that they have suffered, and are likely to suffer, material harm and loss of livelihood as a result of the Project. They claim that more than 50 villages in the district of Badin, Sindh Province, will suffer permanent threat of flooding if the existing LBOD system is further expanded under the NDP. They state that people lost their lives and that widespread destruction occurred due to overflowing, breaches, and sea intrusion during the monsoon rains of 2003. They claim that such “*project-induced displacement*” is not a one time event, and that the people have been made so vulnerable that upcoming drainage effluents in any monsoon season could displace them. They state that this type of displacement has never been considered in the Project, and that “*a full investigation of livelihood losses due to degradation of Wetlands and loss of life, livestock, and of agriculture land due to sea intrusion should be carried out and affected people must be compensated for such losses.*”

The Requesters also allege that the expansion of the drains provided under the NDP will require acquiring several thousand acres of land in the area where they live. They fear that when this happens they will not be properly compensated and rehabilitated as is required by Bank policies. The Requesters state that several thousand families displaced by mainframe routes and the Chotiari Reservoir have not been properly resettled.

Loss of Cultural Property. The Requesters allege that the Kadhan Pateji Outfall Drain (KPOD), a branch drain of the LBOD system, is passing through the cultural area of Roopa Mari, which was the capital of the Soomra rulers where the tomb of Dodo Soomro, the last ruler of Soomra dynasty, is located. They also allege that because of the KPOD and the Tidal Link, floods have hit these places twice in five years. The Requesters state that this threatens

the preservation of the area's history and culture, and believe that with the expansion of the KPOD, the remaining areas and monuments will vanish entirely.

Community Participation and Information Disclosure. The Requesters claim that the local communities and affected people of the coastal belt were entirely unaware of the plans of NDP and of its environmental assessments until the rains of 2003, when they were informed that the existing LBOD system would be expanded. They claim that there is a serious lack of institutionalized mechanisms for information sharing and consultation with the affected people and that the participation of the affected people and local communities in any process of the Project from planning to implementation is negligible. They also allege that local people and organizations have raised the issue with the World Bank and the Government several times but that the Bank, donors and Government authorities remained silent, and practically nothing has been done to respond adequately to these concerns.

Response from Bank Management

Management notes that many of the issues raised in the Request relate to the now-closed LBOD Stage I Project, and asserts that the NDP will not extend the LBOD Spinal Drain any further north. Management states that the conception of the NDP Project was driven by concerns over the deterioration of the drainage infrastructure and the environmental status of the Indus Basin Irrigation System (IBIS), since the lack of an effective drainage system was a threat to the sustainability of agriculture in the Basin. Management also states that the Project was “*frontloaded*’ with an institutional and policy reform agenda and ‘*backloaded*’ with an investment program” in order to focus on strengthening governance and transparency in the irrigation and drainage sector. Management acknowledges that implementation of the Project has proceeded more slowly than expected. Management also asserts that while the NDP Project originally contemplated the NSDS solution, the results of the pre-feasibility studies and reviews by two Panels of Experts led to a preference for other solutions.

Environmental Assessment. Management assigned the NDP Project under OD 4.01 to EA Category B. The Response acknowledges that Category A would have been more appropriate. According to the Response, the Project is otherwise in compliance with many of the requirements of OD 4.01. The Drainage Sector Environmental Assessment (DSEA) of 1993 considered five alternative methods of disposal, reuse, or recycling, and included studies of ecological issues in lower Sindh. Management states that safeguards were built into the Project design. Management asserts that the design of the NDP Project included preparation of an EMP, and that a Water Sector EMP-Framework for Action was developed under the Project in February 2002, with the detailed design for it under preparation. However, Management acknowledges that the EMP has not been implemented as required by the Project Agreement.

Management states that the 1989 Environmental Impact Assessment (EIA) for LBOD expressed concerns that the Tidal Link could have serious ecological impacts on the dhands, and that the northern side of the Tidal Link was raised and the Cholri Weir³ built to prevent over-drainage of the dhands at low tide. Management also states that almost as soon as the LBOD system began operating, the Tidal Link experienced problems, such as collapse of a 250 foot section of the weir. Attempts to close the breached weir failed due to monsoon

³ The Cholri Weir is an anchored 1800 foot concrete-crested retaining wall in the Tidal Link embankment at the Cholri Dhand. It was intended to prevent the dhands from draining into the Tidal Link channel while permitting some inflow at high tide and attenuation of peak water levels.

weather and inaccessibility of the site. A subsequent strong cyclone almost destroyed the weir and further breached the Tidal Link embankment. Management acknowledges disruptions to livelihoods from the severe weather events but does not consider that these disruptions may be attributable directly to damage to the Tidal Link and failure of the Cholri Weir.

Management claims that the NDP implementation did not add to or exacerbate the environmental problems of the already degraded Indus River Delta or the coastal zone. It acknowledges that there are serious problems in the Indus Delta, and attributes them to the development of the Indus Basin Irrigation System, which allegedly changed the freshwater flow and reduced sediment load reaching the Delta.

Involuntary Resettlement. Management notes that some areas of lower Sindh are exposed to flooding, but believes that the implementation of the NDP project did not and will not exacerbate flooding, which allegedly was even greater before LBOD construction. Management states that the Bank has no plans to support the expansion of the KPOD, Dhoro Puran Outfall Drain (DPOD), or the Spinal Drain, and that the only works planned for the KPOD and financed by the Bank are maintenance and repairs. Management adds that the Framework for Land Acquisition and Resettlement (FLAR) was prepared in 1996 to regulate resettlement under the Project, but that local authorities later raised objections to a number of its provisions. When no agreement could be reached, it was decided to include in the IDA-funded investment component only those subprojects that did not involve land acquisition and resettlement. The Bank also decided not to pursue further discussions on the FLAR.

Natural Habitats. According to Management, the NDP project has not supported projects that directly affect the two dhands designated under the Ramsar Convention, the Nurri and Jubho Lagoons, and more detailed assessment is required to determine if these sites are affected by breaches in the Tidal Link and the collapse of the Cholri Weir.

Indigenous Peoples and Cultural Property. Management believes that OD 4.20 is not applicable to the Project because the Mallah fishing community does not meet the criteria of the policy to be recognized as indigenous peoples. With respect to cultural property, Management responds that there are no plans to expand the KPOD under the NDP project and implies that no cultural property would be affected. In addition, the KPOD does not appear to have affected the Dodo Soomro tomb site, since the high water level in the KPOD design is about 1-2m below the site.

Community Participation. Management states that by forming Farmers Organizations (FOs), the NDP project has provided the chance for marginalized groups such as sharecroppers and farmers at canal tail ends to participate in decision-making on water allocations. Management states that the 1993 Drainage Sector Environmental Assessment (DSEA) was disclosed in the Public Information Center in April 1996, although no information about in-country disclosure to affected stakeholders or about subproject EAs could be found. The Framework for Land Acquisition and Resettlement (FLAR) and the Project Information Document (PID) were also available to the public. Management also states that from 2001 a periodic bulletin about the Project in the Sindhi language has been disseminated among farmers.

The Investigation Report and Applicable Policies and Procedures

This Report concludes the Panel's investigation into the matters alleged in the Request for Inspection. Panel Member Werner Kiene led the investigation. Four experts on agricultural water use and hydrology, anthropology and sociology, and environmental science assisted the Panel in the investigation.

The Report examines the merits of the claims presented in the Request. It also considers Management's Response to the claims. It does not provide an evaluation of the Project. In the investigation, the Panel reviewed relevant Project documents and other materials from the Requesters, Bank staff, the national and local authorities of Pakistan, individuals and communities living in the areas affected by the Project, nongovernmental organizations, and other sources. The Panel interviewed Bank staff in Washington and in the Bank office in Islamabad, and visited the areas affected by the Project on two Panel visits in November 2004 and May 2005.

During its visits, the Panel met with Requesters and other individuals and communities, national, provincial and local authorities, representatives of nongovernmental organizations, relevant experts and others. The Panel also gathered considerable data with which to evaluate the Requesters' claims.

In assessing the claims of the Requesters, the Panel considered it essential to analyze the inter-relationship between the NDP Project and the LBOD. The Panel recognizes that the LBOD project closed in 1997, but notes that completion of the LBOD *system* and the Chotiari Reservoir⁴ were carried forward into the NDP Project. The Panel found that an analysis of compliance and harm relating to the NDP Project requires consideration of inter-related elements of the LBOD system and, as relevant to the present circumstances, the Chotiari Reservoir. The Panel notes that the NDP Project included the task of completing the LBOD system, and advanced proposals to expand it significantly. This work depended on the continued functioning of the LBOD system and its Tidal Link. As a result, the Project had to deal with the environmental and social implications of the operations and breakdowns of the system and its Tidal Link that occurred during the course of the Project.

In this context, the Panel assessed whether the Bank complied with the following applicable operational policies and procedures:

- Environmental Assessment OD 4.01 (October 1991)
- Natural Habitats OP 4.04 (September 1995)
- Indigenous People OD 4.20 (September 1991)
- Involuntary Resettlement OD 4.30 (June 1990)
- Management of Cultural Property OPN 11.03 (September 1986)
- Project Supervision OD/OP/BP 13.05 (March 1989 and July 2001)
- Disclosure of Information BP 17.50 (March 1994 and June 2002)
- Emergency Recovery Assistance OP 8.50 (August 1995)

⁴The Bank did not fund this component of the Project after the Borrower's rejection of the FLAR, but retained an obligation to supervise its resettlement component because it remained part of the overall Project. See Chapters 3 and 4 of this Report.

Background and Context

The NDP Project takes place within the broader context of the long history of irrigation in the Indus Basin, stretching over four thousand years of Indus civilizations. For centuries, irrigation was small-scale and localized. In the 18th and early 19th centuries, larger-scale irrigation systems were developed. During the late 19th and early 20th centuries extensive canal irrigation of the Jumna, Ganges, and Indus River valleys expanded these systems.

The Indus Valley contains the largest contiguous irrigation network in the world. This irrigation network led to the opening of vast areas of new farmland in Punjab and Sindh. During the six decades since Pakistan's independence, the World Bank has been the principal donor supporting the construction of major water works, including link canals, barrages and storage reservoirs.

This irrigation network also brought significant problems, including waterlogging and salinity (widely referred to as the *'twin problems'* or *'twin menace'*). Over the years, large-scale drainage mechanisms and other measures have been developed to attempt to resolve these problems. These drainage mechanisms supported agricultural productivity but brought their own social and ecological consequences. The negative health and environmental impacts of the irrigation and drainage system are felt most severely at the tail-end of the system.

The LBOD system and its Tidal Link are major elements of the drainage structures. The Tidal Link is the 26 mile-long and 92 feet-wide drainage canal that connects the entire system to the sea, cutting through areas inhabited by Requesters and the dhands wetland ecosystem. The LBOD and Tidal Link supported agricultural productivity, but also led to significant adverse impacts in areas of southern Sindh -- especially as key Tidal Link structures began to fail. The NDP Project continued the irrigation and drainage work in the Basin. As noted above, the Project set out to complete the LBOD and lay the foundations for long-term drainage solutions, and evolved considerably over time.

Project History, Design and Impacts

For many years, the *"twin problems"* of waterlogging and salinity were generally considered to be mostly of a technical nature, calling for technical interventions. The LBOD project, as a classic investment project focused on infrastructure development, reflects this orientation. More recently, increasing emphasis has been put on addressing these shortcomings through appropriate policies and institutional reforms. This is reflected in the institutional and policy components of the NDP Project and its emphasis on issues of water management and use. At the same time, the NDP Project included a substantial investment component and was designed to complete and, originally, to expand significantly the LBOD system.

To understand and assess the NDP Project, the Panel's Report reviews key aspects of the LBOD project and system. This review focuses on design and performance issues relating to the LBOD system that have had major implications for the handling of the NDP Project, and for the lives, livelihoods and environment of project-affected people.

The LBOD and the Tidal Link: Alignment and Technical Design

The LBOD project focused mainly on Sindh Province. It included: completion of a 300km outfall drain, and the remodeling of existing drains, to dispose saline effluent to the Arabian

Sea; remodeling of canals; construction of the Chotiari Reservoir; and technical assistance. The LBOD Spinal Drain collects and transports effluent from three districts in upper Sindh through branch drains (including KPOD) and the Tidal Link, to the Arabian Sea.

The key decision of the alignment of the Tidal Link was made under the LBOD project. The most appropriate technical option would have been to follow the natural route and link the LBOD with the Shakoor Dhand. This option, however, would have required cutting through the Rann of Kutch which falls within both Pakistani and Indian territory.

Project planners were concerned about the possibility of transboundary environmental damage and the need to avoid activities that could impinge on Indian territory. The Bank eventually accepted the view that the disposal of the drainage water could be solved within Pakistan's territory. The Panel notes that the selected alignment for the Tidal Link was politically attractive because it minimized the discharge of water across the international boundaries. **This alignment was, however, technically and environmentally risky.** Events have confirmed that the area in lower Sindh through which the chosen alignment passed represented an extremely difficult and physically hostile environment. Remote sensing data confirm some of the doubts expressed by the local people.

The Panel's expert reviewed technical aspects of the design of the Tidal Link embankments and the Cholri Weir, including hydraulic calculations, geotechnical testing and bed protection for the weir. **The Panel observes that significant technical mistakes were made during the design of the Tidal Link embankments and the Cholri Weir.**⁵

Records and testimony indicate that the Badin area frequently suffered from flooding due to heavy rainfall events before the implementation of the LBOD system. The designers did not consider, however, that the drainage system would convey the flood water down to the low lying areas of the Badin district much more rapidly than in the past, heightening the existing risk. **The Panel finds that the designers did not evaluate the likelihood that, under prevailing meteorological conditions, high surface water run-off from upstream areas would coincide with high water levels in the Arabian Sea**

The Tidal Link was designed for storms with a recurrence interval of about five years, which was not adequate for works that could potentially lead to flooding of major structures, settlements and peoples. The designers of the Tidal Link also assumed that, under storm conditions, people living upstream of the main drains would reduce sub-surface discharges by closing irrigation canals so that the full capacity of the surface drainage network would be available for storm water discharge. **The design assumption failed during the July 2003 rainfall.** In addition, no provisions were made to temporarily store excess surface water in storage areas or agricultural land in the event that simultaneous high tides from the sea prevented flood water run-off. **The Panel finds that the main drain should have been designed with a higher safety margin.**

The Panel notes that there were no provisions for emergency plans, controlled flooding of dedicated areas or flood control gates, nor for emergency closure of the Tidal Link. No facilities were in place to warn the population and mitigate flood impact. **The Panel finds that the LBOD designers underestimated the risk of extreme meteorological events and made insufficient arrangements to deal with storms of higher intensity.**

⁵ The Panel also observed instances of poor quality construction (as discussed in the body of the Panel's Report).

The Panel finds that the Tidal Link structures were critical to the performance of the system but the design had substantial inherent risks. The design and construction went ahead without adequate provisions to minimize the risk that the structures would give way and to mitigate possible harms. The underestimation of risk and lack of appropriate technical measures have contributed to suffering of local people in lower Badin.

Structural Failures and Impacts on Local People and the Environment

The design of the LBOD and Tidal Link was not in harmony with the prevailing winds and the natural flow of water. Even while the structures were holding, gradual changes to the ecosystem occurred.

As the Tidal Link structures began to fail, the problems worsened. The Cholri Weir, one of these structures, was built to maintain water levels in the dhands, protect them from Tidal Link effluent, and prevent them from draining into the Tidal Link channel. From the beginning, its functioning caused concern. Measurements in September 1996 revealed a very substantial flow over the weir. During the night of June 24, 1998, a large section of the weir collapsed. Efforts to repair the damage met with great difficulties; the scour was deep and the area remote.

On 21 May 1999, a tropical cyclone Category 2A hit the tidal areas of Thatta and Badin Districts, and the Cholri Weir was nearly totally destroyed. As a result, seawater over-ran the Tidal Link. **Fifty-four breaches in the embankments occurred at different locations, bringing devastation and loss of life to the adjacent communities.** Since then the breach has developed into a tidal creek and saline sea water enters freely the Cholri Dhand and the Pateji Dhand. Both dhands empty when the water flow is reversed during low tide. The embankments along the Tidal Link essentially crumbled away, but the channel continued functioning as a drainage outfall.

The effects of the LBOD system on people and the environment in lower Sindh have been severe. These effects are linked to changes in water balance, water flows and salinity, as well as chemical contamination of waters flowing into the region. **The LBOD system, combined with the partial destruction of the Tidal Link, has heightened the risks to local people from flooding. The situation is particularly bad when heavy rainfall inland and high tides and storm at sea coincide. Floods during monsoon rains in 2003 led to the loss of many lives.**

In addition, increased salinity has affected large tracts of agricultural lands and the Tidal Link failure has led to major harm to the dhands ecosystem, wildlife and fisheries, upon which many people depend for their livelihoods. People in these areas also face serious problems of drinking water, and have lost grazing lands. The overall morphology of the region is being changed

Evolution of the NDP Project

The NDP Project as designed during appraisal was quite different from the Project that closed on December 31, 2004. A host of political, institutional and operational problems led to slow implementation. Since the investment component was linked to progress on institutional reforms, the Project came to a practical standstill in 2000.

Management reported at Mid-Term Review that substantial work had been undertaken to complete the LBOD remaining works. At the same time, a number of changes were

introduced. Among other things, significant funding was shifted to non-Project related drought problems (about US\$135 million), and the originally envisioned investment component was scaled back. In this regard, **Management stated in its Response that the “NDP will not extend the LBOD Spinal Drain further north.” The Panel notes this important development** (discussed below). Recent Project documents indicate, nevertheless, a substantial level of physical investment under the NDP Project, though reduced from levels originally planned.⁶

The Project also supported development of a new Drainage Master Plan (DMP). The DMP sets forth approaches to address continuing problems of waterlogging and salinity in the Indus Basin. As discussed below, the DMP offers a number of new and constructive approaches to address drainage issues, but also raises questions regarding the future direction and scale of drainage infrastructure work relating to the LBOD system. In addition, during implementation of the NDP Project, the Bank fielded missions to investigate and respond to the failure of the Tidal Link. The decisions taken in this regard are discussed below.

Environmental Compliance

Water Flows and Environmental Conditions

Pakistan is facing a variety of major health and environmental problems linked to inadequate environmental flows. “Environmental flows” refers to the minimum flow of water that should be released in a river below a diversion in order to conserve people’s livelihoods and their environmental support system downstream until the next adequate tributary flows in the river. In the Indus Basin, however, there is a sharp asymmetry of costs and benefits of the irrigation and drainage system in the Basin. In general, the upstream abstracters of the waters who use it for irrigation receive the benefits, while downstream people mostly in the Badin and Thatta Districts of Sindh Province incur the costs.

The most severe impacts, particularly in southern Sindh, have long been well known. They include problems of water supply and pollution, saline intrusion harming agriculture, damage to mangrove systems and aquatic resources, harms to wildlife, and major health and poverty-related problems linked to acute scarcity and contamination of drinking water.

The LBOD system, as described above, has itself led to significant adverse environmental effects in the southern portions of Badin and Thatta Districts. With the collapse of Tidal Link structures, the water and salinity balance of the dhands ecosystem has changed profoundly. This has led to major decreases in birds and waterfowl, the loss of distinctive vegetation and other fauna in the shallower areas of the dhands, and major decreases in fish species and numbers in the dhands. More broadly, the LBOD structures are part of the overall transformation of water and sediment flows in the lower delta.

The NDP Project has supported a variety of actions that have affected, or could affect, environmental conditions of concern to the project affected people. On the one hand, it has included policy and institutional reforms to build foundations for more socially and environmentally sustainable approaches to resolve drainage problems. At the same time, it

⁶ The Panel notes that Project documents often use general terms in describing investment proposals and actions, which makes it difficult to assess and examine what precisely has been done. This ambiguity is magnified by the often large budget figures and broad geographic scope of coverage of some of the components.

has included investments to complete the LBOD and has advanced or supported new proposals that would expand the scope and/or volumes of waters received through the LBOD.

Environmental Assessment

The NDP Project is subject to the provisions of OD 4.01 on Environmental Assessment (October 1991). OD 4.01 states, inter alia, that the purpose of environmental assessment “*is to improve decision making and to ensure that the project options under consideration are environmentally sound and sustainable.*”

- **Project Area of Influence**

A clear understanding of the spatial and temporal parameters of a project is fundamental to its proper evaluation and assessment. The Panel observes that at the time of the preparation of the LBOD project, the Bank did not clearly define the area of influence of the project. Moreover, the Bank assumed that there *would be* no adverse effects *if* adequate safeguards were provided in the project design. The possible impacts on the *people* of south Badin and Thatta, in particular the possible impacts on those residing in the vicinity of the lower outfall structures, were not adequately assessed despite the major physical works undertaken there.

The NDP Project, by spanning four provinces, had a broader geographic scope than the LBOD project, but made the focus of social analysis narrower. **Despite certain references in the 1993 DSEA, there did not appear to be any further study of the possible impacts of the drainage program on the people who depended upon the dhands for at least part of their livelihood, nor of any possible impact of increased drainage waters flowing through the Tidal Link.**

The area covered by the Requesters’ claim falls within the general area of the LBOD project and within the project area of influence of the NDP Project. **The Panel finds that under the NDP Project neither the potential environmental nor the potential social impacts of the Project in the area of concern to Requesters were considered in a meaningful way until the submission of the Request.**

- **Environmental Screening and Level of Analysis**

Environmental screening is essential to environmental assessment under OD 4.01, and “*determine[s] the extent and type of environmental work required.*” Screening assigns a project to one of three categories, A, B or C. A project is classified as Category A if it “*is likely to have significant adverse impacts that may be sensitive, irreversible and diverse.*”

The NDP Project contemplated not only institutional and policy actions but also significant infrastructure investments, including completion and operation of the LBOD and the Chotiari Reservoir. **Further development of the LBOD was intended to improve drainage but, in addition, had and has the potential to intensify significantly harms to people and the environment generated by the existing system, especially in southern Sindh.**

The NDP Project also was designed to lay the foundation for the long-term approach to drainage in the Basin. At the time the screening decision was made, the envisaged approach included the NSDS drainage superhighway, and the investment budget was very substantial. This long-term planning had major potential environmental implications, especially for those

at the downstream end of the system in southern Sindh. **The development of such a long-term approach could help to resolve existing problems, but could also create the possibility of significant, irreversible environmental harms and cumulative impacts.**

The Bank assigned the NDP as “Category B” under OD 4.01. **Management has acknowledged that “Category A” would have been more appropriate. The Panel notes this acknowledgment,** and believes that Management should have realized that the overall Project concept and design posed significant environmental risks and the potential for far-reaching environmental impacts. **The Panel finds that the decision of the Bank to categorize the Project as “Category B,” rather than “Category A,” did not comply with OD 4.01.**

- **Analysis of Alternatives**

Careful comparison of realistic alternatives is an important feature of environmental assessments. Without systematic consideration of realistic alternatives, any environmental assessment is seriously flawed. Under OD 4.01, the analysis of alternatives enables decision-makers to consider options to prevent, minimize, mitigate or compensate for adverse impacts.

The 1993 DSEA contained substantial information regarding environmental conditions in the Basin, and the effects of irrigation and drainage infrastructure up to that point in time. **On these issues, the Panel commends the Bank and the Borrower for their efforts and analysis.**

However, the Panel notes that certain problems arise in relying on the 1993 DSEA analysis of alternatives. The DSEA was completed in 1993, before the first signs of the collapse of the Tidal Link structures in 1996 which profoundly altered environmental conditions in the region. In this context, **the 1993 DSEA suggested that there would be no appreciable environmental effects from the expansion of the LBOD.** The 1993 DSEA also did not include improved water management and user practices as a basic alternative (these were, however, included within NDP Project actions).

The Panel finds that the 1993 DSEA analysis of alternatives rapidly became out of touch with the situation on the ground. Most importantly, the analysis underestimated the potential negative environmental effects in southern Sindh of relying upon and expanding the LBOD. As a result, it did not provide an adequate basis to inform decision-making for the NDP Project on the core question of available alternatives, as required under OD 4.01.

- **Analysis of Potential Impacts**

OD 4.01 provides that “[a]ll environmental consequences should be recognized early in the project cycle.” The analysis should include an “[i]dentification and assessment of the positive and negative impacts likely to result from the proposed project.”

The 1993 DSEA analyzed various potential impacts from actions in the drainage sector, but paid little attention to potential impacts on the environment and on non-Project beneficiary communities at the downstream end of the drainage system in southern Sindh. This might be linked, in part, to the fact that the DSEA was developed before the breakdowns in the Tidal Link. The extent to which the Bank reacted to these changing conditions is reviewed in more

detail in Chapter 5 (Supervision). For the present purposes, **the Panel finds that the 1993 DSEA analysis failed to identify and assess adequately critical environmental concerns of relevance to the affected areas in southern Sindh Province.**

The Project Implementation Volume refers to ecologically sensitive wetlands in the lower Indus Delta and to a concern about uncontrolled irrigation and damage. It does not, however, provide an analysis of how the NDP Project -- which at that time was laying the foundation for the NSDS -- might avoid or mitigate potential harm to these wetlands. Similarly, the SAR itself postpones assessment of impacts until after appraisal of the Project, but before appraisal of specific investments having significant impacts. **The Panel finds that Project documents noted the issue of potential impacts upon wetlands in southern Sindh, but did not assess how the Project might affect those wetlands or identify required mitigation measures at the critical stage of Project design and appraisal, as called for under OD 4.01.**

- **Environmental Management Plan (EMP), Mitigation and Compensation**

A “Category A” EA includes an environmental mitigation or environmental management plan that identifies *feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels.*” It sets forth details to help ensure that the proposed environmental actions “*are in phase with the proposed engineering or other project activities throughout implementation.*”

NDP Project documents discuss the EMP and outline important actions to be further developed and implemented The Bank Tidal Link Fact-Finding Mission in March 2001 also identified specific actions to respond to problems of the Tidal Link. The draft EMP Framework developed in February 2002 reflects further efforts to develop and implement the Project EMP.

Management highlighted, in 2001, that the “*lack of progress*” in developing an EMP for NDP was a “*critical problem,*” and noted the lack of an institutional framework for an EMP. Management states in its Response that because the strengthened monitoring program as recommended in the March 2001 Mission was not implemented, “*mitigation measures have not been identified and decided.*”

The Panel observes that some of the actions outlined in NDP Project documents were not implemented or fully developed by the time the Project closed. Management also acknowledges that there was a failure to implement the EMMP for the LBOD project. **The Panel finds that there has been a failure to develop and, in particular, to implement adequately an EMP for the Project. This does not comply with OD 4.01. The EMP and its implementation are crucial to an Environmental Assessment.**

The Panel recognizes the challenges under the Project in developing and implementing such a Plan. Nevertheless, the failure to do so, in line with OD 4.01, has been a major obstacle to the ability of the Bank to respond to the concerns of the Requesters in this Project.

Requesters claim that they should receive compensation for environmental and social harms suffered as a result of the NDP Project and inter-related elements of the LBOD system. The Panel considers that the local people have suffered great harm and hardship, which is in significant part a result of these structures and their failures. The decision not to repair the

Tidal Link, on grounds of feasibility, allows negative effects to continue. OD 4.01 provides that an environmental mitigation or management plan “*should consider compensatory measures if mitigation measures are not feasible or cost effective.*”

Management informed the Panel that the GoS wrote to the Bank (letter dated May 2003) to request funds for restoration of damages inflicted on LBOD, KPOD and DPOD. In its Response (letter dated June 7, 2004), Management indicated that NDP funds could be used to restore damaged systems and “*therefore*” suggested the use of Project funds “*to help in the mitigation of possible flood damages to people, livestock, farms and farm structures.*”

The Panel notes Management’s suggestion to make NDP funds available to mitigate flood damages to people. As the Panel was finalizing this Report, Management informed the Panel that the Government had provided funds to some individuals and families affected by the floods, including “death compensation” (318 people; 125 in Badin and Thatta) and compensation for houses fully damaged and partially damaged. Management did not provide further information on what had been considered and done with respect to compensation in relation to the Project, including whether these payments referred to compensation for losses and/or income restoration. The Panel notes that significant Project funds seem to have been available, and were re-allocated under the Project to address other needs, including US\$135 million for drought relief actions not related to the Project.

The Panel notes Management’s recent action to carry out a socioeconomic study of the livelihood of the people living in the affected area, and related planned actions. The Panel observes that this could yield new action in line with Bank policy.

Following the Request for Inspection, Management also assembled an International Panel of Experts (IPoE) to review the performance of the LBOD system and recommend next steps. The IPoE issued its report in May 2005. **The Panel notes that several recommendations of the IPoE are designed to respond to the many problems facing the local communities living near the Tidal Link and dhands, including problems of sea water intrusion, flood risk, damage to the dhands, and negative impacts on livelihoods.**

There remains, however, the question of whether and how these recommendations will be implemented. The Panel observes that there have been significant shortcomings in implementing previously proposed recommendations to address problems faced by local communities. The Panel notes the critical importance of consultation with affected communities, especially in light of the IPoE discussion of conditions for possible northward extension of LBOD, a matter of central concern to Requesters.

- **Monitoring Plan**

An “Environmental Monitoring Plan” is another key element required in a “Category A” EA under OD 4.01. This plan should specify the “*type of monitoring, who would do it, how much it would cost, and what other inputs (e.g., training) are necessary.*”

The Panel notes that the NDP Project funded a monitoring program by the National Institute of Oceanography (NIO) and the WAPDA monitoring cell. Management acknowledges, however, that no report on *ex post* sampling of ongoing work has yet been prepared, and that the strengthened program of monitoring and analysis recommended by the 2001 Fact-Finding

Mission has not been undertaken. **The Panel commends Management for supporting the NIO monitoring program activities but finds that a comprehensive analysis and interpretation of data is still absent.**

- **Consultation**

Under OD 4.01, the Bank expects the Borrower to take fully into account the views of affected groups and local NGOs in project design and implementation, in particular in the preparation of EAs. This process is important in order to understand the nature and extent of any social or environmental impacts, and the acceptability of proposed mitigation measures, particularly to affected groups. The record of consultation with affected groups and local NGOs, and issues of compliance, is examined below and in Chapter 4.

- **The Drainage Master Plan**

The Panel considers that the funding of the development of the DMP is one of the most significant activities of the NDP Project. The DMP is designed to deal in a constructive way with many of the problems that have arisen in connection with drainage in the region, and contains ambitious and wide-ranging new plans, including for infrastructure, to address drainage needs in the Basin. **The DMP is likely to have major environmental and social implications for a long time .**

The NDP Project carried out an initial screening to determine the appropriate category of EA for the DMP. To the Panel's surprise, the DMP was designated as a Category "B" project under Bank policies. This assignment was made notwithstanding the fact that the draft DMP contemplated not only multiple projects over years, but also a major new drainage investment and expansion referred to as the Trans Basin Outfall Drain (TBOD). The international Panel of Experts (IPoE) that reviewed the draft DMP in December 2004 referred to the TBOD as the NSDS proposal but with a different name. The IPoE stated that "[g]iven the magnitude of the Programme, a Category A would be required."

The Panel finds that the development of the DMP merited a Category "A" designation under OD 4.01, and that the designation of it as Category "B" did not comply with Bank policy. The proposed TBOD, among other elements of the draft DMP, had the potential to lead to high adverse environmental consequences that may be sensitive, irreversible and diverse within the meaning of OD 4.01.

The final version of the DMP, released while the Panel was finalizing its Report, appears to have modified substantially the draft version of August 2004. Among other things, **the final DMP makes little mention of an expansion in the drainage system along the lines of the TBOD or NSDS. The Panel understands this to mean that such structures are no longer planned. The Panel notes, however, certain ambiguities in the DMP text on this issue, and seeks clarification in light of the concerns of the Requesters.** The Panel also observes that the DMP appears to retain major plans for increasing the flow of effluent into the LBOD within Sindh province.

The Panel notes that the final DMP includes a provisional Environmental Assessment and a framework for environmental management, and that there are plans for "detailed environmental study" on the DMP's effects on minority groups or tribal minorities. The Panel remains concerned, however, about the process through which the DMP was

elaborated. The far-reaching impacts to be expected, the Bank's assignment of Category "A" for each basin, and the large budget proposed to implement the DMP, should have triggered a Category "A" designation for the DMP.

The Panel notes that OD 4.01 envisions different types of EAs, including sectoral and regional EAs, depending on the nature of the proposed action. These types of EAs provide the opportunity for the strategic and integrated analysis needed for multi-faceted proposals and programs such as the DMP. Such analysis can take place in consultation with potentially affected stakeholders, at the crucial stage of program design and identification of proposed actions and budgets.

- **Environmental Advisory Panels**

OD 4.01 provides that for "*major, highly risky, or contentious projects with serious and multidimensional environmental concerns*" the borrower should normally engage an environmental advisory panel (EAP) of independent, internationally recognized environmental specialists. In line with OD 4.01, the EAP needs to be in place early to ensure that terms of reference are adequate for any environmental and social work to be carried out during feasibility or design.

An appropriate EAP was not put into place, however, until 2004. Project consultants and WAPDA convened many environmentally-related committees before then, but they were almost entirely rearrangements of existing engineers with little or no environmental experience. Occasionally this lack of environmental expertise was recognized, and the committee invited civil society organizations to contribute. **The Panel considers that the failure to put in place an EAP for the NDP Project until 2004 is not consistent with the intent of OD 4.01.**

- **The Chotiari Reservoir**

The Requesters raised concerns about the impacts of the Chotiari Reservoir. The Chotiari Reservoir and embankment was the largest investment component of the LBOD. It was mostly finished under the LBOD project and then carried into the NDP Project for completion. While the Bank did not fund this component of the NDP Project after the Borrower had rejected the resettlement framework, the Bank retained an obligation to supervise it.

From the outset, the environmental analysis of Chotiari Reservoir and embankment has been beset with problems. The Bank's 5 November 1984 SAR asserts, with no supporting evidence, that "*Chotiari reservoir impoundment would create negligible damage and resettlement costs, since only a few accommodations for fishermen are located in the reservoir inundation area.*" This reservoir inundation area, however, is a large area of rare, unique and important habitat and wildlife (displacement and resettlement issues are noted below). An appropriate EA for the NDP Project would have properly assessed these impacts before appraisal, when critical decisions on the Project were being made. This assessment could have built upon previous analysis as available.

- **Consequences to Project Affected People and the Environment**

A proper and timely “Category A” Environmental Assessment for the NDP would have provided the necessary opportunity for the Bank to analyze fully risks and issues presented by the Project, and to identify alternative approaches that would minimize adverse impacts and maximize possibilities to restore and improve the environment. It might also have assisted the Project in giving closer attention during both the design and implementation phases of the Project to the specific impacts upon the environment and to the Project affected population in southern Sindh.

The Panel finds that as a result of shortcomings in the Environmental Assessment, decision-making on environmentally crucial elements under the Project became less systematic, less informed, and more *ad hoc*. As a consequence, the Bank missed important opportunities in the Project to address concerns raised by Requesters, and to consider possible compensation for harms that could not otherwise be mitigated. This did not comply with OD 4.01.

Natural Habitats

OP 4.04 on Natural Habitats sets forth provisions intended to ensure that Bank-financed projects support the protection of natural habitats, and do not result in their significant conversion or degradation. Under OP 4.04, a particularly stringent standard of protection applies to “*critical natural habitats*.”

- **The Dhands and Sites Listed under the Ramsar Convention**

The dhands in southern Sindh are not normally connected to the ocean. Typically, they are seasonal, shallow, brackish water lagoons. They are biodiversity-rich, and situated on international migration routes of many species of birds and waterfowl which arrive by the tens of thousands. Fish and birds in the highly productive freshwater were a mainstay of the livelihoods of the people of Badin and Thatta.

The chosen route of the Tidal Link runs through the dhands and directly impacts the Cholri and Pateji dhands. The chosen route has also suffered from being south-west in direction. This has meant that prevailing (strong) monsoon winds, tides and wave action tend to back the effluent up the drain, increasing the risk of spillage of effluent upstream. This is what happened soon after LBOD was built.

When the Cholri Weir collapsed in May 1999, the Cholri and Pateji dhands became tidal sea water inlets. This situation is taking a high environmental toll. Rising salinity in the dhands, in particular, is compromising their biological integrity; birds and waterfowl are suffering; distinctive vegetation is being lost; and there has been a major decrease in yields and species composition of the fisheries.

It is difficult to judge the extent of negative impacts resulting from the NDP as distinct from the LBOD. The Panel notes that the NDP Project took substantial actions to complete the LBOD system, and the Bank failed to address problems that arose during NDP Project implementation **The Project focused on ensuring the evacuation of LBOD effluents, and paid little attention to impacts on, or means to rehabilitate, the dhands as a habitat and ecosystem. This was not consistent with OD 404.** The recommendation of the Bank Fact

Finding Commission in 2001, to establish a scientific group to monitor the situation following the failure of the Cholri Weir, was not implemented, and there were significant shortcomings in the development and implementation of both the LBOD EMMP and the NDP Project EMP.

Some of the affected sites are included on the Ramsar Convention List of Wetlands of International Importance. The Ramsar Convention provides an internationally-agreed framework for the “conservation” and “wise use” of wetlands and their flora and fauna. Pakistan became a Party to the Convention on November 23, 1976, and has designated 19 sites on the List. These include the Jubho Lagoon (Sanhro Dhand), the Nurri Lagoon (Mehro Dhand) and the Rann of Kutch.

Generally, the ecosystems of the dhands surrounding the lower part of the drainage system in the Sindh are under severe threat. Data show substantial declines in migratory birds at Jubho Lagoon. Remote sensing images reveal a decrease in the size of the Mehro, Sanhro and Cholri dhands since 1989, and especially since the collapse of the Cholri Weir. According to the Panel expert, the hyper-salinity readings in the Rann of Kutch are remarkable and the Pateji Dhand, which is interconnected with dhands listed under the Ramsar Convention, is biologically dead. **The Panel finds that the negative effects on the dhands amount to a “significant conversion or degradation” within the meaning of OP 4.04. Although it is difficult to separate impacts of the LBOD system from those of investments financed under the NDP Project, the evidence indicates that the two, in combination, have contributed to significant adverse impacts on these internationally recognized sites.**

The Panel also finds that the Bank did not adequately consider the risks of further degradation of the Jubho Lagoon, a critical natural habitat. This is not consistent with OP 4.04. In light of further work on the LBOD system, and in planning for the implementation of the DMP, it will be crucial to be aware that other critical natural habitats in the region are under a similar threat, including the Rann of Kutch and the Nurri Lagoon. These Ramsar-listed sites are the type of critical natural habitat that Bank policy promises not to significantly convert or degrade.

- **Rehabilitation of Degraded Natural Habitat**

The irrigation and drainage mechanisms in the Basin reflect an extraordinary level of investment and effort to make water available for the benefit of agriculture. In light of OP 4.04, it is important to ask to what extent efforts have been made to rehabilitate habitats that have been harmed by these efforts. Low-cost measures to do so, such as biological re-vegetation, exist.

Paragraph 3 of OP 4.04 states that the Bank *“promotes rehabilitation of degraded natural habitats.”* As described above, **the NDP Project in combination with the inter-related LBOD system have contributed to significant negative effects on natural habitats, including the dhands. The Panel finds that the Bank did not meet the provisions of OP 4.04 to take action not only to conserve, but also to rehabilitate, these habitats.**

Social Compliance

Impacts on Local People and Their Culture

The devastating impacts on local people of the cyclone of 1999 and the monsoon rains of 2003, noted above, are described in detail in the Report. The Requesters claim that given these experiences, they expect more flooding in the future which will have tragic consequences for them and their way of life. They highlight that there are several thousand local people who entirely depend on local dhands for fishing and on grazing and agriculture for their livelihood. They fear that these people will be forced to leave their ancestral villages by saline water flooding their area. They also fear that expansion of the KPOD, DPOD and Spinal Drain will drain several thousand acres, causing them to lose their remaining land.

Management responds that areas of lower Sindh are indeed prone to flooding, but that flooding was greater before construction of the LBOD Stage 1 Project. Management believes that *“the implementation of the NDP project has not and will not exacerbate flooding”* and notes that a Panel of Experts rejected the drainage superhighway concept. Management states that the Bank no longer has plans to support the expansion of the KPOD, DPOD, or the Spinal Drain. The only works planned for the KPOD and financed by the Bank are repairs.

Indigenous Peoples

The Requesters claim that most of the coastal communities are Mallah, indigenous people with close attachment to ancestral territories. They claim that there are 60 Mallah villages of 25,000 people who fish in the local waters and in the sea, some close to the KPOD and Tidal Link. They consider that the possible impacts on these people of the KPOD and Tidal Link and of the NDP were never assessed, and that the cyclone of 1999 and monsoon rains in 2003 ruined their economic base. According to the Requesters, faulty operation of the LBOD and breaches in the KPOD were major contributing factors. The Requesters state that *“[a]ready poor, these communities were pushed into further absolute poverty.”*

Management, in its Response, considered that OD 4.20 on Indigenous Peoples was not applicable. Management considers that Mallah are an occupational group, not an ethnic one and that the GoP did *“not have a classification for Indigenous Peoples.”* Management adds that the Mallah community is not considered indigenous because it does not meet the criteria specified in the Bank’s OD 4.20. Management also considers that the lives and livelihoods of the Mallah fishing community were not disrupted in 1999 and 2003 by the LBOD and Tidal Link, but instead *“the flooding that occurred during these extreme events would likely have been worse had the LBOD and the Tidal Link not been in place.”* Management concedes though that *“no studies have been undertaken to date to determine impacts on this community that might stem from the changed water regime of the dhands.”*

Bank Policy on Indigenous Peoples

When the LBOD Project was prepared, the policy on Tribal People in Bank-Financed Projects, OMS 2.34, was operative. The policy was intended for *“tribal groups that are relatively isolated and less acculturated,”* and lists criteria to identify indigenous peoples. It is clear that this policy focused on groups ethnically, culturally, socially, economically, and also often linguistically very distinct from the more dominant and sometimes antagonist societies around them. **The Panel notes that the Mallah in Badin are not so distinct or separate -**

whether culturally, socially, or economically – as to be considered a tribal group under the provisions of OMS 2.34 during the preparation of the LBOD project. While they do have some ethnically distinct characteristics and have an economic lifestyle largely dependent on traditional fishing, they do not fit clearly the other provisions of OMS 2.34.

OD 4.20 on Indigenous Peoples replaced OMS 2.34 in September 1991, and was applicable when the NDP project was prepared. The intent of the new directive is to support ethnic minorities “*with a social and cultural identity distinct from the dominant society*” who might be overlooked during the design of a development project. The directive broadened the scope of Bank policy from “*tribal groups*” to include “*indigenous peoples,*” “*indigenous ethnic minorities,*” and “*scheduled tribes.*” It also lists criteria to identify indigenous peoples, but does not require that all criteria be met for the policy to be triggered.

The issue of ethnic minorities in Pakistan is complex and contradictory. Many people interviewed during the field visit described the *Mallah* as an “original” or “ancient” Sindhi group. On several occasions, when the Panel asked for clarification on the claim that the *Mallah* are indigenous, it was told that the *Mallah* are original Sindhis, and that Sindhis are the indigenous people of Sindh. There is some substance to the argument since, though they are a majority of the population in the province, Sindhis are a minority in the entire country.

The *Mallah* seem to fit more, but not all, of the criteria of OD 4.20. They are traditionally fishermen, with claims to traditional fishing grounds. The *Mallah* identify themselves and are identified by others as a distinct group, on the basis of ethnic and slight linguistic differences. They are impoverished and vulnerable. On the other hand, culturally, socially, and politically, the *Mallah* in Badin are well integrated into the broader rural Sindhi society. While there are some customs and traditions that are unique to the *Mallah*, those customs and traditions are not so distinct as to separate the *Mallah* from the rest of the society, which is a key element of OD 4.20. Though some villages consist entirely of *Mallah*, in other villages they live together with several other castes and groups.

The Panel notes that the *Mohana* of Manchhar Lake who have migrated to Badin and Thatta appear to fit the criteria of OD 4.20 more. The 1993 DSEA also mentions certain nomadic groups, likely referring to the *Kuchi* or the *Cholistani* nomads.

In this context, the Panel finds that Management did not initiate a process to determine whether the NDP Project would affect any group of people which would qualify as indigenous peoples under OD 4.20. OD 4.20 states that Task managers “*should make use of specialized anthropological and sociological experts throughout the project cycle.*” **The Panel finds that the Bank needed to consult with local anthropological and/or sociological experts to determine whether or not any of the ethnic groups living within or near the Project area would qualify as indigenous peoples under OD 4.20. The failure to do so does not comply with OD 4.20. The Panel notes that at least some of these groups may have required an Indigenous Peoples Development Plan (IPDP) under OD 4.20 during Project preparation. Such a document, or a similar document, could have identified potential Project impacts on these people and set forth measures to mitigate risks and potential harm.**

Cultural Property

The Requesters claim that Thatta and Badin districts have a rich cultural history and that the Project has affected and will affect a number of important cultural sites. Management disputes claims that the Project is harming cultural properties, and states that OPN 11.03 is not applicable to the Project.

OPN 11.03 on the Management of Cultural Property in Bank-Financed Projects was effective in September 1986 and during the design of the NDP Project. It follows the United Nations definition of cultural property, which “*includes sites having archeological (prehistoric), paleontological, historical, religious, and unique natural values. (...) The World Bank’s general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination.*”

The Request refers to three sites: the tomb of Shaikh Kirhiyo Bhandari, Roopa Mari and the tomb of Dodo Soomro, and Tharri. The Panel notes that Sindh is filled with important cultural and historical sites, among them several World Heritage Sites under the 1972 World Heritage Convention.

When the LBOD project was being prepared, the World Bank had no cultural heritage policy. However, when the NDP Project was being prepared, OPN 11.03 was in effect. A cultural assessment of the drainage areas covered in the Project was needed, given the wealth and wide distribution of the Indus Valley’s cultures and historic (and prehistoric) settlements. As indicated in OPN 11.03, this assessment could have been a brief reconnaissance survey by a specialist.

Management should not have assumed there are no sites of cultural value, just because sites are not listed under the national registry. There can be sites of local importance that are not recognized at the national level, whether because of limited resources or lack of archeological exploration and preservation, or because of divisions in responsibilities among national and local authorities, or other reasons.

The Panel was not able to find any evidence to substantiate the claim of Requesters that the Project has affected cultural property. The Panel finds, however, that under OPN 11.03, Management should have, during preparation and appraisal, undertaken a brief reconnaissance survey of cultural heritage in areas potentially affected by the Project and consulted with local archeological and historical experts to determine whether any sites of national, regional or local cultural heritage could be adversely affected by the Project. Such an expert assessment could have helped determine whether potentially important sites could be threatened by waterlogging and salinity as a result of Project activities and, conversely, whether sites might benefit from effective drainage.

Involuntary Resettlement

OD 4.30 on Involuntary Resettlement was applicable during the design and implementation of the NDP Project. This directive provides the framework for resettling people who have been displaced as a result of development projects. These projects may include, among others, irrigation canals. The Policy also notes that “[r]efugees from natural disasters, war, or civil strife are also involuntary resettlers, but they are not discussed in this directive (see OP/BP/GP 8.50, Emergency Recovery Assistance, discussed below).”

- **Project Induced Displacement**

One of the claims of Requesters is that there has been “project induced displacement” because people have been forced from their homes by the cyclone of 1999 and more so by the floods of 2003. The Panel notes that the 1999 cyclone and 2003 floods forced many people to leave their homes. The destruction of their homes, livestock, farms, and the deaths of more than a hundred people are well documented. The descriptions by the people who lived through these events are heart-rending.

Though the people are still suffering from the losses of 2003, their resettlement was temporary. Many returned to their original communities within two to three months after the flood. Nevertheless, the Panel wishes to underscore the concern that the floods are not a one-time event, and that the heightened threat of dangerous flooding is ongoing.

A second aspect of this claim is that people are forced to leave the area because of loss of livelihood and other environmental problems attributed to the LBOD and Tidal Link. The increased salinity of the ground water is attributed by many in the affected area to the intrusion of sea water and the increased effluent brought to the area by the LBOD. The Panel found that the structures have contributed to sea water intrusion. The Panel heard from local people south of the canal that the water in their villages was no longer fit to drink or grow crops, and they had to walk several kilometers across the canal for water (good only part of the year). They claimed that several villages had been nearly completely abandoned. The Panel notes, at the same time, that it is difficult to disaggregate the many causes contributing to increased salinity of ground water, including decreased supply of fresh water and the recent drought.

As described previously, increased salinity has also made vast tracts of agricultural land unproductive. Many villagers interviewed by the Panel claim their land has become so barren that they can no longer plant anything of value and are forced to earn their living by producing charcoal from brush. The Panel observed that agricultural areas appeared extraordinarily bleak.

A drastic decline in fish species and number has also been attributed to the failure of the Tidal Link and the intrusion of seawater much farther inland. While there can be no debate that a decline has occurred, it is again difficult to attribute this solely to the LBOD and Tidal Link. A Bank Mission report in 2001 notes, nevertheless, the “*major risk*” of loss of livelihood of poor fisherman who depend on the dhands due to the collapse of the weir and Tidal Link breaches. Other sources refer to over fishing, the lack of freshwater released into the Indus River below the Kotri Barrage, years of drought and recent disasters.

The Panel considers that fisherman, farmers, and herders who have substantially lost their livelihoods due to project-related impacts, and people put at higher ongoing risk of catastrophic floods, may very well be displaced against their will. While other factors may have contributed to these harms, this does not necessarily bar the application of relevant Bank policies to redress these harms and restore lost livelihoods.

NDP Project documents at appraisal refer to assurances of the Borrower that land acquisition and involuntary displacement will be handled in accordance with Bank policy, and note

specifically the issue of land acquisition for civil works. The documents do not, however, refer specifically to the possibility of the type of displacement noted above.

The Panel considered whether the Bank should reasonably have anticipated that the Project could lead to such displacement. OD 4.30 would be applicable if appropriate risk analysis under the Project indicates a significant possibility that it will cause or substantially contribute to involuntary relocation. The Panel notes that there were significant concerns about the Tidal Link structures prior to Project appraisal. The 1989 EIA for the LBOD indicated that, under several scenarios, the Tidal Link could fail and that “[f]ishing, and the livelihood of those fisherman dependent on the dhands, would be drastically affected.” The Panel’s analysis indicated that the selected route was technically and environmentally risky, the land was subject to storm events and the Bank underestimated risks to residents along the structures during construction and design. In 1996, one year after the Cholri Weir opened, it began to break down

OD 4.30 states that *“the possibility of involuntary resettlement should be determined as early as possible and described in all project documents.”* **The Panel recognizes that the Tidal Link situation was in flux at appraisal, but notes that signs of major risk were present. The Panel observes that the Bank, at appraisal of the NDP Project, failed to identify emerging risks that LBOD/Tidal Link problems could lead to significant harms and even displacement of local people, even though the Project had plans to complete and expand LBOD.**

Just a few months after appraisal, in June 1998, a large section of the weir collapsed. The situation worsened with the near total collapse of the weir in the cyclone of 1999. When the 2001 Bank Fact-Finding Mission determined that repair of the weir and embankments was not feasible, Bank staff acknowledged the *“major risk”* of loss of livelihood. The Panel found no evidence, however, of planning for protective resettlement either before or after this finding.

The great risks faced by the people came to pass with the floods of 2003, and are ongoing. A Bank report in April 2003 states that because the affected people are politically and economically depressed, they *“would not be compensated unless an arm like the World Bank takes up their cause.”* **The Panel finds that the Bank failed to take the necessary actions under OD 4.30 to identify and prepare for the possibility of such displacement, and to assess the extent to which it has occurred**

For vulnerable groups, OD 4.30 calls for *“land allocation or culturally acceptable alternative income-earning strategies to protect the livelihood of these people.”* **Given that the NDP Project is closed, the Panel is concerned about what may be done to redress harms, protect against possible ongoing displacement, and support livelihoods.**

- **Emergency Recovery Assistance**

The Panel notes that assistance for involuntary displacement caused by disasters, whether natural or human-made, can also fall under the Bank’s Policy on Emergency Recovery Assistance, OP 8.50. While the GoP requested Bank assistance for emergency repairs to the LBOD system, **the Panel did not find evidence that Project funds were used to redress damages to the affected people, although such financing would have been available**

under OP 8.50. This is in contrast with the US\$135 million transferred for financing activities unrelated to the Project to provide relief from drought.

- **Dislocation due to Land Acquisition for Civil Works**

The Request also includes claims relating to loss of lands acquired to expand existing canals and to build new canals. **Aside from the unresolved issues of Chotiari Reservoir, the Panel found no evidence of dislocation of people due to civil works during the NDP Project.** The Panel notes, at the same time, that Requesters and residents in the affected area repeatedly expressed their concern that extension of the LBOD system into Punjab would require expansion of existing drainage canals, which would require acquisition of their lands.

- **Framework for Land Acquisition and Resettlement (FLAR)**

The FLAR was prepared by the GoP based on agreements with the Bank. Under the FLAR it was recognized that the existing legislation did not adequately cover compensation for Project affected persons other than landowners. A review of documents concerning the FLAR confirms that agreement had been reached between the Bank and the Borrower on the FLAR before Project approval. The Borrower objected to the FLAR only after the NDP Project was initiated. After the Borrower objected to the FLAR, the Bank decided not to fund Project components that required resettlement. A resettlement program did continue for those families displaced by the Chotiari Reservoir.

The Panel finds the FLAR to be an appropriate document which was consistent with the requirements of OD 4.30. The preparation of the FLAR, the initial agreement with the Borrower, and its acceptance as part of Project appraisal, were consistent with Bank policy requirements. The Panel notes that following the Borrower's rejection of the FLAR, the Bank decided to withdraw funding from those Project components which, in Management's view, required resettlement. This was also consistent with OD 4.30.

Consultation, Community Participation and Disclosure of Information

Most Bank policies that require consultation, participation, and disclosure were in place when the NDP project was prepared and appraised. Provisions for consultation are found in OD 4.01 on Environmental Assessment and OD 4.30 on Involuntary Resettlement. Policies on disclosure of information fall within BP 17.50 Disclosure of Operational Information and the 1994 version of the World Bank Policy on Disclosure of Information.

- **Consultation and Participation**

During NDP Project implementation, Management insisted that the Borrower abide by the condition that the agreed-to institutional reforms first be implemented before physical works could be carried out. The Panel notes that Management made efforts during NDP Project preparation to try to consult with and solicit the participation of a wide range of stakeholders and beneficiaries involved in this complex project covering much of the country. The Bank carried out extensive consultations in establishing the Farmers' Organizations (FOs) and Area Water Board, and tried to make them reasonably effective participatory institutions. The Panel also saw Sindhi language newsletters prepared by the SIDA Transition Team as part of their communications with FOs and other stakeholders. **Within the boundaries of the pilot projects and the areas covered by**

effective FOs and AWBs, the NDP project complied with Bank policies that require consultation and participation.

The Panel identified, however, serious problems with consultation and participation for the people living downstream of LBOD, including those closest to the Tidal Link. Villagers interviewed in the affected area do not distinguish between the LBOD Project and the NDP Project. In their minds it is one continuous program which brings both saline waste water from the north and sea water from the south into their ground water and lands. During Panel interviews, none of the villagers who were questioned recalled any consultation initiated by government agencies, Bank staff, or NGOs concerning the construction or expansion of the LBOD, KPOD or Tidal Link. Local residents claimed that they had learned about these works when machinery arrived. Villagers interviewed by the Panel in the affected areas said they were not involved in any Farmers' Organizations (FOs), nor did they participate in irrigation activities. Residents of the affected area claimed that Bank missions visited their communities only after the flooding in 2003. **Unfortunately, the people of southern Sindh, whose lives were already recognized as being affected by the Tidal Link, fell outside the field of vision of those who designed and appraised the project.**

Management noted that the failure to implement the LBOD EMMP led to a lack of public awareness of issues relating to the need to manage sustainably the fishery and ecosystem of the dhands. **The Panel finds that an even more important consequence of this failure to implement the EMMP was an apparent lack of attention to the impacts of the structural failure of the Tidal Link on the local people at the tail end of the LBOD and KPOD, until the floods, death and devastation of 2003.** Only after the collapse of a large section of the Cholri Weir in 1998 and the 1999 cyclone that irreparably destroyed the weir, did the area near the Tidal Link and, to a lesser extent, the communities in that area, receive more attention.

While the Bank complied with policy provisions on consultation and participation with regard to the direct irrigation beneficiaries under the NDP, it did not comply with them with regard to those adversely affected by the drainage systems investments under the LBOD and the NDP.

- **Disclosure**

The policies concerning disclosure of information fall under BP 17.50 Disclosure of Operational Information and the 1994 version of the World Bank Policy on Disclosure of Information. The 2002 version was in effect when the Request for Inspection was made. *“[T]imely dissemination of information to local groups affected by the projects and programs supported by the Bank, including nongovernmental organizations, is essential for the effective implementation and sustainability of projects.”*

The Requesters indicate that several Project documents they asked to review were available in the WAPDA offices, but were difficult to understand as they were all in English. According to Management, only one briefing document on the Project was translated into local languages. Management could find no information on the country disclosure of several key documents.

The 2002 Disclosure Policy requires that most Bank documents be made available to the public. This does not necessarily mean, however, that Management distributes all these

documents in project-affected areas. In general, the Policy provides that documents will be made publicly available through the Infoshop at Bank headquarters or at in-country Public Information Centers, one of which is in Islamabad, or via the Internet. The Policy specifies that certain documents, including Environmental Assessment Reports and Resettlement Instruments, are to be made available at a place accessible to project affected people and local NGOs.

Management has acknowledged that the NDP Project did not comply with BP 17.50 with respect to disclosure of the EA, since the 1993 DSEA was not disclosed in-country to affected stakeholders. The Panel notes this acknowledgement.

The Panel also observes that Management actively ensured that Project information was provided to farmer beneficiaries in compliance with Bank Policies, but did not apply the same efforts for other affected people in southern Sindh, which is not consistent with the objectives of the applicable Bank Policy on Disclosure of Information. **The Panel recognizes that information disclosure in the region involves significant logistical difficulties. At the same time, local people affected by the Project face major obstacles in gaining access to Project-related information that is of vital significance to them**

Supervision

OD 13.05 states that project supervision is one of the Bank's most important activities. According to OD 13.05, the main purpose of supervision is to "(a) *ensure that the borrower implements the project with due diligence to achieve the agreed objectives and in conformity with the loan agreement; (b) to identify problems promptly as they arise during implementation and help the borrower resolve them (...)* (c) *to take timely action to cancel a project if its continuation is no longer justified, particularly if it can no longer be expected to achieve the desired development objectives.*

- **Problem Identification and Corrective Measures**

The Panel reviewed supervision of the implementation of actions relating to the Tidal Link under the LBOD in light of its significant consequences for local people and the environment. During the investigation, the Panel witnessed numerous examples of poor quality work in relation to the Tidal Link structures. The Panel found, however, that problems in construction were not elevated to the level of a major concern by supervision missions until some eight years after the beginning of construction, in 1996. Even then, once recommendations were made, there was no consistent follow-up or action on the matter until May 1998 when a Bank dam specialist visited the project and urged immediate action to address the deteriorating situation.

The Panel recognizes the complexities of supervision and follow-up in a large-scale multi-donor effort such as LBOD. The Panel finds, nevertheless, that the record of supervision indicates that one source of the problems with the Tidal Link was the failure to give sufficient attention to technical problems that arose during its construction.

The Panel also reviewed Management's supervision documents to assess Bank's supervision and response to the failure of the Tidal Link and its embankments. **The Panel finds that from late 1998 until the time that the Panel received the Request in September 2004, Management's supervision reports demonstrate sporadic concern for the physical**

damage to the Tidal Link. The Panel finds that the lack of response to the failure of the Tidal Link does not comply with OD 13.05.

The Panel also did not find evidence that project-affected persons were adequately consulted during Bank supervision. **The Panel finds that Management was slow to visit the site of the Tidal Link failure, and did not have a consistent approach to interacting with the local population to understand and address the social and environmental implications of this failure. Management’s failure to consult with downstream affected-people for over half a decade following the breaches in the Tidal Link is of great concern to the Panel. This does not comply with OD 13.05.**

The Panel reviewed supervision documents and other records to identify factors or reasons that might explain this failure of supervision. **The Panel observes that Management failed to assign the appropriate expertise for the supervision of technical aspects of the construction work. As a result, Management failed to identify serious flaws in the design and implementation of the Project, and to initiate corrective measures in a timely manner. This does not comply with OD 13.05.**

- **Transparency and Reporting**

The Panel reviewed the extent to which the major problem presented by the collapse of the Cholri Weir was reported within Management. As noted above, the weir showed signs of serious problems in 1996, and Bank missions became increasingly concerned about this between 1996 and 1998. The May 1998 dam specialist report should have alarmed Management. Surprisingly, however, the LBOD project Implementation Completion Report (ICR), which was prepared at about the same time, contained practically no mention of the serious technical difficulties.

The Cholri Weir collapsed only one week after the publication of the ICR. This started the unraveling of the drainage outfall system. The Panel is concerned that the ICR that was circulated to the Board was insufficiently transparent on important shortcomings of the project. The Panel cannot explain why Management’s internal checks and balances did not detect the discrepancies between the final report and supervision reports, and why the final ICR was not amended, once it was shown to have been misleading in its assessment of the Project’s outcomes.

The Panel notes that once the Request was submitted, Management devoted significant resources to identify the problems better and to develop long-overdue responses to help the affected people.

Conclusions

The Panel’s investigation found that the Project design, appraisal, and supervision process focused on the direct beneficiaries of irrigation water and improved drainage. **Down-stream effects, including those on the local populations of southern Badin, did not feature in any significant way either in the design or supervision of the Project.** There was also a failure to develop a complete systems view early in the NDP Project as reflected by the restricted focus of the Project and the EA. This hampered the Borrower’s and the Bank’s ability to assess impacts, consider alternatives, and develop mitigation measures for the Project-affected areas in Southern Sindh in line with Bank policies. The absence of proper

feedback mechanisms within the Bank prevented social problems that were detected from being elevated with the necessary urgency to senior Management. **To a very large degree, the damages suffered by people in the project-affected areas, described in this Report, have not been redressed, and many of the same conditions that led to these harms are still in place.**

The Panel notes that the Bank has recently become engaged in preparing a Sindh Coastal Areas Development Program. If carried out successfully, this has the potential to bring some form of support to the areas and people affected by the events described in this Report. The Panel also appreciates recent initial actions by the Government to address the structural problems causing harms to the affected population. The Panel notes the importance of implementing effectively actions addressing the needs of the affected populations.

Chapter 1: Introduction

A. Events Leading to the Investigation

1. The Request

1. On September 10, 2004, the Inspection Panel received a Request for Inspection⁷ (the “Request”) related to the Pakistan: National Drainage Program Project (the “NDP Project” or the “Project”), which is partly financed by the International Development Association (IDA).⁸ The Request was submitted by Khadim Talpur, Mohammad Ali Shah, Mustafa Talpur, Munawar Hassan Memon, Iqbal Hyder, Mir Mohammad Buledi, and Najma Junejo on their own behalf and on behalf of *‘others who live in the area known as district Badin, Sindh, Pakistan’* in the Indus River Basin. The Requesters allege that *“[they] have suffered, or are likely to suffer, harm as a result of the World Bank’s failures in the National Drainage Program Project (NDP) credit no 2999-PK, being implemented in Indus Basin Irrigation System in Pakistan (...).”*⁹
2. On September 17, 2004, and in accordance with the Resolution establishing the Inspection Panel (the “Resolution”), the Panel notified the Board of Executive Directors (the “Board”) and the President of the Bank that it had received the Request, which constituted Registration of the Request under the Panel’s ‘Operating Procedures.’¹⁰
3. The Panel received Bank Management Response to the Request on October 19, 2004 (the “Response”).¹¹
4. The Requesters claim that they have suffered, or are likely to suffer, *“material harm and losses of livelihood”*¹² as a result of the Project, which is partly financed by a Bank Credit of US\$285 million equivalent.
5. According to the Request, the expansion of drains under the NDP will entail the *“forceful acquisition of land,”* which *“will ruin [project-affected people’s] livelihood base.”*¹³ The Requesters also state that the National Surface Drainage System (NSDS), which is *“centered on the northwards extension of the [Left Bank Outfall Drain] LBOD as a spinal drain,”*¹⁴ and the use of the disposal system through the

⁷ Request for Inspection of the Pakistan: National Drainage Program Project (Credit No. 2999-PAK), dated September 9, 2004, in Inspection Panel Report and Recommendation, November 24, 2004, Annex I, [hereinafter “Request for Inspection”]. The Request was received electronically. Prior to issuing the Notice of Registration, the Panel received a hard copy of the Request with over 2,000 original signatures.

⁸ For the purposes of this Report, the International Development Association (IDA) is referred to as “the Bank.”

⁹ Request for Inspection, ¶ 2.

¹⁰ IDA Resolution No. 93-6, September 22, 1993, para 17, and Inspection Panel, Operating Procedures, August 19, 1994, ¶ 17, at www.inspectionpanel.org.

¹¹ Bank Management Response to Request for Inspection of the Pakistan: National Drainage Program Project (Credit No. 2999-PAK), October 19, 2004, in Inspection Panel Report and Recommendation, November 24, 2004, Annex II, [hereinafter “Management Response”].

¹² Request for Inspection, ¶ 3.

¹³ Request for Inspection, ¶ 3-III.

¹⁴ Request for Inspection, ¶ 3-IV. The Bank-financed Left Bank Outfall Drain Stage 1 project (LBOD) was approved in 1984 to address the “twin problem” of water logging and salinity in the Indus Basin. This project provided for, inter alia, the construction of a spinal drain connecting the drainage network of three districts in

Tidal Link is not sustainable, because the Tidal Link's failure has already caused the loss of thousands of acres of land. The Requesters further state that the "*super engineering ideas [that] have been used against the natural flows*" are causing them harm, while the "*alternate project options or disposal systems, which are historical natural disposal systems, have been ignored.*"¹⁵

6. The Requesters assert that more than 50 villages in the district of Badin, Sindh Province, will suffer permanent threat of flooding from the disposal of upstream saline effluents if the existing Left Bank Outfall Drain (LBOD) system is further expanded under the NDP. The Requesters claim that the "*overflowing, breaches and sea intrusion during 2003 rains*"¹⁶ have already caused the death of more than 30 people, damaged thousands of houses, and destroyed thousands of acres of agricultural crops.
7. The Requesters claim that "[t]he proposed drainage network will badly affect the already degraded environment of Indus Delta." They contend that the absence of fresh water, which is essential for coastal forests and marine life, in addition to the disposal of "*toxic drainage effluents will destroy the remaining resources of marine fisheries and mangrove forests.*" The Requesters further state that the drainage effluent contains not only saline sub-soil water but also residual traces of pesticides, fertilizer, and industrial waste accumulated along the way.¹⁷
8. They allege that because of the effect of tidal flows from the sea, the flow of effluent in the drainage system is blocked twice in each daily cycle, and that this blockage causes the effluent to seep into the Kadhan Pateji Outfall Drain (KPOD) up to a distance of RD110 (110,000 feet), which negatively affects the quality of ground water, "*which is a single drinking source, thus causing severe impact on human health.*"¹⁸
9. The Requesters further allege that the NDP will cause the destruction of two dhands (coastal wetlands), the Nurri Lagoon and the Jubho Lagoon, protected by the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat for their "*significance for migratory birds and other significant biodiversity and ecosystem values.*" The Requesters allege that the Project violates Bank Policy because it disregards Pakistan's "*requirements under international environmental treaties and agreements,*" since Pakistan is a Party to the Ramsar Convention.¹⁹
10. They further consider that the failure of the Tidal Link and the Cholri Weir (an 1800-foot long concrete-crested weir along the Cholri *Dhand*) to moderate water levels "*has caused severe damage to the ecosystem, habitat and fish catch*"²⁰ of these dhands and

upper Sindh to the sea through a Tidal Link (LBOD system). The Credit financing the LBOD project (IDA Credit No. 1532-PAK) closed in 1997. See Chapter 2B(1) (The Left Bank Outfall Drain (LBOD)), for a detailed description of the LBOD system.

¹⁵ Request for Inspection, ¶ 3-V.

¹⁶ Request for Inspection, ¶ 3-II.

¹⁷ Request for Inspection, ¶ 3-VI.

¹⁸ Request for Inspection, ¶ 3-VII.

¹⁹ Request for Inspection, ¶ 3-40.

²⁰ Request for Inspection, ¶ 3-46.

adversely affected the “*livelihood resources to the forty villages of fishermen having a 12000-15000 population and living around these water bodies.*”²¹

11. The Requesters consider that the majority of the coastal communities are *Mallahs*, a community they classify as “*indigenous people,*” because of their close attachment to ancestral territories and distinct identity “*which is different from dominant society.*” The Requesters state that this population, which lives in more than 60 villages and reaches 25,000 individuals, is “*marginalized and vulnerable.*” They state that the *Mallahs*, “*engaged in fishing at both sea and contiguous wetlands,*”²² will be adversely affected by the Project.
12. Furthermore, the Requesters claim that this community has suffered “*significant changes in the lives of [its] people,*” specifically during a cyclone in 1999 and monsoon rains during 2003, and that in both events the Tidal Link and KPOD “*inundated their villages, damaged houses and some families even lost their family members.*”²³ They claim that their traditional fishing grounds have been damaged by the LBOD and the intrusion of sea water into the dhands and inland waterways, and that agriculture in the area also has been damaged. They add that the Project will affect this “*marginalized and vulnerable group of indigenous communities*” and “*the worst affected will be women due to gender inequality in society.*”²⁴
13. The Requesters state that the districts of Thatta and Badin “*have been a rich cultural location due to the vicinity of sea as well as the Indus Delta.*” They allege that the Tidal Link and KPOD are already affecting very important sites in Badin, including “*the monuments of saint Shaikh Kirhiyo Bhandari [and] the historical site of Roopa Mari and thari,*” sites which “*were the important town of the dynasty of Soomra ruler in Sindh (1051 to 1351).*”²⁵ The Requesters further state that “[t]he KPOD is just passing through the identified 4 km area of Roopa Mari, where the soomra rulers have their capital. The tomb of Dodo Soomro the last ruler of [the] Soomra dynasty is also located there,”²⁶ and that “[s]ome of these archeological sites have been explored and other has been just identified by several historians and archeologists.”²⁷ The Requesters fear that, as a result of the Project, “*the remaining portions of these important historical sites will be destroyed.*”²⁸
14. The Requesters claim that given recent experience with major floods, they expect more flooding in the future which will force them to leave their “*ancestral homes.*” They also claim that many families were displaced from lands along the main drainage channels and from the Chotiari Reservoir during implementation of the LBOD Project, and that they have not been properly resettled. In their claims on resettlement, the Requesters refer to: people forced from their homes by the cyclone of 1999 and more so by the flood of 2003; people forced to leave the area because of

²¹ Request for Inspection, ¶ 3-VIII.

²² Request for Inspection, ¶ 49.

²³ Request for Inspection, ¶ 50.

²⁴ Request for Inspection, ¶ 52.

²⁵ Request for Inspection, ¶ 3-X.

²⁶ Request for Inspection, ¶ 54.

²⁷ Request for Inspection, ¶ 53.

²⁸ Request for Inspection, ¶ 3-X.

loss of livelihood and other environmental problems attributed to the LBOD and Tidal Link; and loss of lands acquired to expand existing canals and to build new canals.

15. The Requesters state that the *“planning of NDP has never considered the problem in existing disposal system and conceived to bring more effluents in faulty system to dispose. These faults combined with seasonal (and predictable from a planning standpoint) shocks i.e. cyclone in 1999 and monsoon rains of 2003 created havoc with our lives and livelihood. There has been no recognition of our losses at policy level or compensation, because we are considered poor, powerless and voiceless.”*²⁹
16. The Requesters allege that the *“local communities, and especially the affected people of [the] coastal belt, have been kept entirely unaware about the plans of [the] NDP and its environmental assessments.”*³⁰ They further state that the Project *“planning process remained the business of a few bureaucrats and donors while project implementation remained non-transparent and hence failed to obtain informed consent or meaningful participation since the inception.”*³¹ The Requesters claim that they *“were entirely unaware [of the] NDP until the rains of 2003, when [they] were informed that more effluents would be added [to the] existing LBOD system.”*³² They also claim that they have protested *“since the inception of the project”* and have *“attempted several times to approach local implementing agencies as well as World Bank officials to discuss [their] concerns regarding NDP,”*³³ but that they have received no response.
17. Finally, the Requesters call for *“the World Bank Inspection Panel [to] undertake an independent investigation into the policy violations in this project and recommend, in consultation with affected people, measures for bringing it into compliance and for correcting the harm that has been caused by policy violations.”*³⁴ They Requesters further call for *“[t]he calculation of losses occurred due to failure of LBOD and full reparation of the affected communities.”*³⁵
18. The Request alleges that Bank actions and omissions in the design, appraisal and implementation of the Project, constitute violations of various provisions of Bank Policies and Procedures: OD 4.01 on Environmental Assessment; OP 4.04 on Natural Habitats; OD 4.20 on Indigenous People; OD 4.30 on Involuntary Resettlement; OPN 11.03 on Management of Cultural Property; OD/OP/BP 13.05 on Project Supervision; and, BP 17.50 on Disclosure of Information.

2. Management Response

19. On October 19, 2004 the Panel received Bank Management’s Response to the Request for Inspection. The Response considers that many of the issues in the Request relate to

²⁹ Request for Inspection, ¶ 16.

³⁰ Request for Inspection, ¶ 55.

³¹ Request for Inspection, ¶ 3-XI.

³² Request for Inspection, ¶ 3-XI.

³³ Request for Inspection, ¶ 4.

³⁴ Request for Inspection, ¶ 78.

³⁵ Request for Inspection, ¶ 78.

the LBOD Project, closed in 1997, and asserts that the NDP will not extend the LBOD Spinal Drain any further north.³⁶

20. Management states that the NDP Project is in compliance with many of the requirements for OD 4.01 (Environmental Assessment), including preparation of a sectoral EA and requirements for screening subprojects. However, Management acknowledges that no report on ex-post sampling of ongoing work has yet been prepared to ensure compliance with covenants on screening, nor has the Environmental Management Plan (EMP) been implemented as required by the Project Agreement. Regarding the classification of the NDP Project as EA category “B”, Management states that category “A” would have been more appropriate for the Project.³⁷ Concerning the consultation process, Management adds that “[c]onsultations were held during the project preparation phase with representative NGOs, FOs, and CBOs to define the overall program and to outline the consultation and appraisal criteria and process for individual subprojects. Local consultations were carried out during preparation of subprojects.”³⁸
21. Management states that OP 4.04 (Natural Habitats), OD 4.20 (Indigenous Peoples), and OPN 11.03 (Cultural Property) were not applicable to the Project.³⁹ According to Management the Indigenous Peoples Bank Policy does not apply to the Mallah fishing community because the community does not meet the criteria specified in OD 4.20 for classification as Indigenous People.⁴⁰ On involuntary resettlement, Management states that because agreement with the GoP over the FLAR (Framework for Land Acquisition and Resettlement) could not be reached, IDA did not finance any subprojects involving resettlement; therefore, OD 4.30 did not apply.
22. According to Management the Project failed to comply with the disclosure requirements for BP 17.50 (Disclosure of Operational Information) “*since the DSEA [Drainage Sector Environmental Assessment] was not disclosed prior to appraisal at the Infoshop and no records of disclosure in country could be located.*”⁴¹
23. Describing the context of the Project, Management states that areas of lower Sindh are indeed prone to flooding, but that flooding was greater before the construction of the LBOD Project. Management states that construction of a spinal drainage system goes back to the 1960s and includes, in addition to the spinal drain, the remodeling of the KPOD and the DPOD, and the construction of a 26-mile Tidal Link canal connecting the KPOD to an active tidal creek.
24. According to Management a 1989 Environmental Impact Assessment (EIA), however, brought forth concerns that the Tidal Link could have serious ecological impacts on the dhands, and that “*the lack of a complete baseline and continuing, systematic, scientific and well coordinated monitoring and study of the area remain critical*

³⁶ Management Response, ¶6.

³⁷ Management Response, Annex 1, Item 2, p. 17.

³⁸ Management Response, Annex 1, Item 11, p. 23.

³⁹ Management Response, ¶ 44.

⁴⁰ Management Response, ¶ 44 and Annex 1, Item 20, p. 28.

⁴¹ Management Response, ¶ 44 and Annex 1, Item 20, p. 28.

issues.”⁴² Management adds that almost as soon as it began operating, the Tidal Link experienced significant erosion, scouring, and the collapse of a 250 foot section of the Cholri Weir, and in May, 1999 a catastrophic cyclone hit the area and destroyed the Cholri Weir in its entirety.

25. Management states that a 2001 Bank Tidal Link Fact-Finding Mission, which summarized the physical and socio-economic conditions of the dhands area, recommended a strengthened monitoring program and more data collection and analysis. According to Management, the mission concurred with the Government of Sindh (GoS) that the damage to the Tidal Link and the Cholri Weir was beyond repair. The mission also found that the Tidal Link was continuing to function well, but salinity of the dhands had probably changed. Management concludes that *“drainage effluents alone would not be the cause of increased secondary salinity, if it has occurred.”*⁴³
26. Concerning the NDP Project, Management states that it was originally the product of a new strategy for Pakistan’s water resources conceived between the Government of Pakistan (GoP) and IDA in 1994 and driven by particular concern over the lack of an effective drainage system, which was a threat to the sustainability of agriculture in the Basin.⁴⁴ Management states that the NDP Project was *“deliberately ‘frontloaded’ with an institutional and policy reform agenda and ‘backloaded’ with an investment program”*⁴⁵ in order to focus on strengthening governance and transparency in the irrigation and drainage sector. Management acknowledges that implementation of the Project has proceeded slower than expected.
27. During 2001 – 2002, a pre-feasibility study of the NSDS was done, envisaging a 1,464km drain in length to carry drainage effluent from Punjab to the sea. After fielding a Panel of Experts (PoE) to review the study, along with the GoP, the Bank endorsed the PoE’s recommendation to defer the NSDS unless alternative measures, such as institutional and policy reforms, efficient irrigation management, local stakeholder participation and local disposal solutions, proved inadequate. Again, in September 2004, an International Panel of Experts (IPoE) for the Drainage Master Plan (DMP) confirmed that a drainage superhighway concept was not feasible. Management adds that *“preparation work for the NDP project, as well as the studies supported during its implementation, sought to consider all reasonable alternatives for disposal of Indus Basin drainage effluent.”*⁴⁶ According to Management, the DSEA in Chapter 5 of the Main Report considered five alternative methods of disposal, reuse, or recycling.
28. Management affirms that *“the NDP project is being implemented in a manner that does not add to or exacerbate the environmental problems of the already degraded Indus River Delta or the coastal zone.”* Management acknowledges that there are serious problems in the Indus Delta, and attributes them to *“the drastic change in*

⁴² Management Response, ¶ 32.

⁴³ Management Response, Annex 1, Item 8, p.21.

⁴⁴ Management Response, ¶ 7.

⁴⁵ Management Response, ¶ 11.

⁴⁶ Management Response, Annex 1, Item 4, p.18.

freshwater flow and reduced sediment load reaching the Delta brought about by the development of the Indus Basin irrigation system (especially since the 1960s).’’⁴⁷

29. Management further affirms that “[w]hile a poverty-targeted intervention is certainly needed in the lower Badin area, Management believes that the NDP project is not the right instrument for this and further, that implementation of the NDP project has not worsened the plight of the people living near the dhands. The National Rural Support Program, with resources from the Pakistan Poverty Alleviation Fund (PPAF), has been active in Badin District for the last three years and has completed approximately 50 community infrastructure projects that have included watercourse linings, hand pumps and link roads, all aimed at improving livelihoods.’’⁴⁸
30. Management states that the Bank will take three specific actions regarding the Project: (1) assemble an IPoE to review ecological, hydrological, and water quality monitoring data in the LBOD outfall area and propose a course of action; (2) conduct a Diagnostic Study of livelihood improvements in the area to determine the losses suffered and formulate an assistance program; and (3) assist the GoP with a Country Water Resources Assistance Strategy and a Strategic Country Environmental Assessment.

3. Eligibility of the Request

31. To determine the eligibility of the Request and the Requesters, as set forth in the 1993 Resolution establishing the Panel and the 1999 Clarifications, the Panel reviewed the Request for Inspection and the Management Response and, in November 2004, visited Islamabad, Pakistan, and the Sindh Province, including Project-affected people in the district of Badin.
32. During the field visit, Panel Member Werner Kiene, together with the Panel’s then Assistant Executive Secretary Andrew Thomson, and Panel Operations Officer Serge Selwan, met with the Requesters, local people in the Project area, national and provincial government officials, WAPDA and SIDA officials, district officials, local NGOs, and World Bank staff. Before and after the visit to Pakistan, the Panel consulted with the Bank’s Executive Director and the Alternate Executive Director representing Pakistan and with their staff.
33. As reported in its Report and Recommendation, the Panel determined that the Request fulfilled the eligibility requirements for inspection. The Panel also determined that the Request for Inspection and the Management Response contain conflicting assertions and interpretations concerning the issues, the facts, compliance with Bank policies and procedures. Accordingly, the Panel recommended that the Board of Executive Directors approve an investigation.⁴⁹
34. On December 8, 2004, the Board approved the Panel’s recommendation to conduct an investigation into the matters alleged in the Request for Inspection. The Request, the

⁴⁷ Management Response, Annex 1, Item 4, p.18.

⁴⁸ Management Response, ¶ 45.

⁴⁹ Inspection Panel Report and Recommendation on Request for Inspection of the Pakistan: National Drainage Program Project (Credit No. 2999-PAK), November 24, 2004, ¶ 81-83.

Management Response, and the Panel's Report and Recommendation were made public shortly after the Board's decision to authorize the inspection sought by the Requesters.

B. Context: Irrigation and Drainage in Southern Sindh Province

35. A core element of the Request is that the Project is aggravating serious harms to people and the environment linked to existing irrigation and drainage structures in the Basin, and the Bank is failing to take the necessary actions to correct and compensate for these problems. Of particular concern to Requesters is the possible expansion of the LBOD system. They claim that this system already has worsened the effects of floods, leading to the loss of many lives, and has in many other ways harmed them greatly. The Requesters claim that past and potential further harms have been caused by the Bank's failure to comply with several of its operational policies and procedures.
36. To assess these claims, and to understand the NDP Project, it is important to review the nature and evolution of irrigation and drainage structures in the Basin and their effect on social and environmental conditions of the Requesters and the communities that they represent.
37. The NDP Project takes place within the broader context of the extensive and large-scale irrigation and drainage system of the Indus River Basin. This system, described in more detail in Chapter 2, has supported the creation of vast new areas of farmland in Punjab and Sindh and major increases in agricultural production. It has also, over time, substantially altered the Basin water flows, landscape and ecology and generated significant impacts on people's health, livelihoods and the environment.
38. Pakistan's paramount water source, the Indus, is allocated to irrigation principally in Punjab and Sindh and to a minor extent in Balochistan. The irrigation system developed over the last century includes inundation canals, barrages, dams and reservoirs, as well as public and private tubewells for (heavy) abstraction of groundwaters (see Chapter 2). A nominal water fee (called Abiana) is charged for canal water whereas, in general, pumping groundwater and abstraction is free, and the costs of energy for pumping are subsidized.
39. The irrigation projects made water available for the benefit of agriculture, but also brought significant problems, including waterlogging and salinity (referred to in the policy and engineering context as the "*twin problems*" or "*twin menace*").⁵⁰ In response, large-scale drainage mechanisms (along with other measures) were developed in an attempt to resolve these problems of waterlogging and salinity. These drainage mechanisms supported agricultural productivity but brought their own social and ecological consequences.⁵¹
40. The negative health and environmental impacts of this system are felt most severely at the tail-end of the system where the Requesters reside. Much of Sindh is constrained by shortages of fresh water, particularly in the coastal Sindh districts of Badin and

⁵⁰ Chapter 2 provides more detailed information on the nature and extent of the "twin problem".

⁵¹ The World Bank has been a leading donor in the development of irrigation and drainage structures in the Basin for decades.

Thatta. Drainage effluent is saline and contaminated by agricultural runoff and biocides over time.⁵²

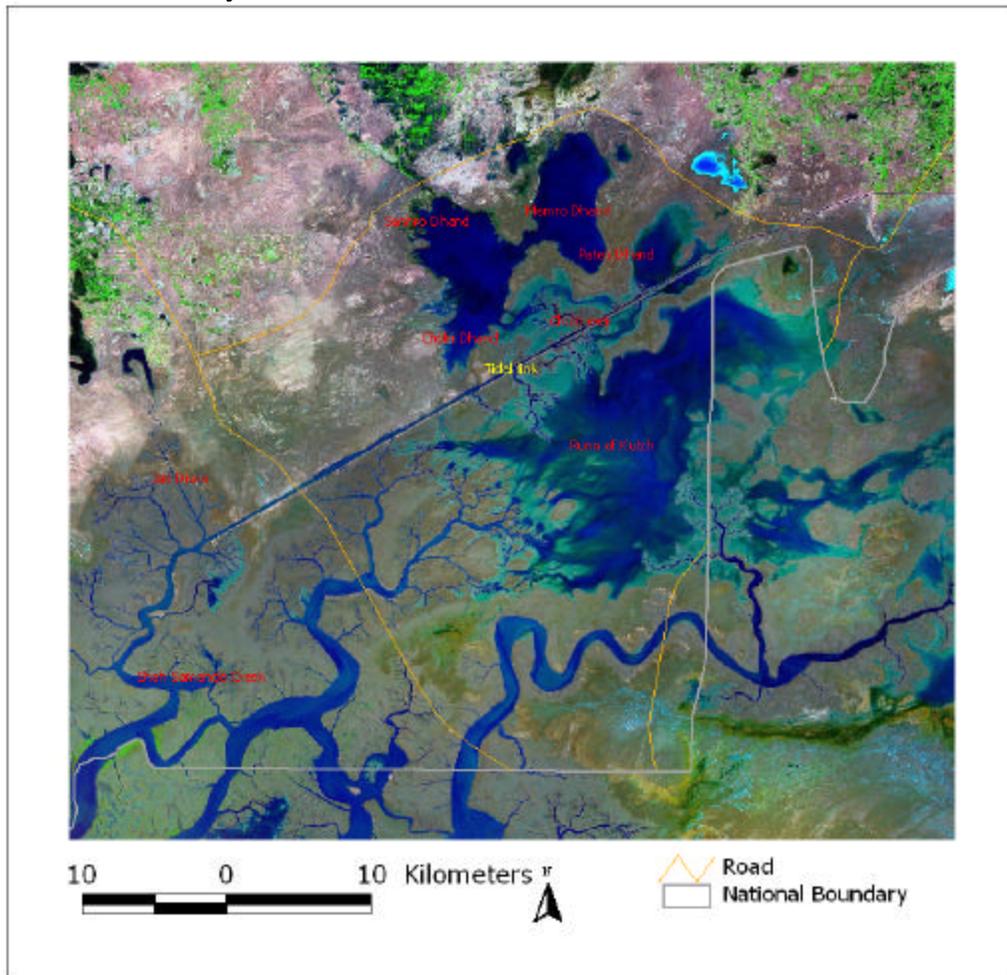
41. There is a sharp asymmetry in the costs and benefits of this overall system. In general, the upstream abstractors of the waters using it for irrigation receive the benefits, while downstream people in southern Badin and Thatta districts incur the costs, with little or no compensation.
42. The Left Bank Outfall Drain (LBOD) is a major component of the irrigation and drainage structures in the Basin.⁵³ The LBOD system consists of a “spinal drain” and related structures that drain effluent south to the Arabian Sea. The critical southernmost section of the LBOD system consists of a Tidal Link -- a 26 mile drainage canal and embankment cutting southwesterly from the LBOD system to the Sea. The location of the Tidal Link within the context of the drainage structures is shown in the Map relating to the NDP Project attached to this Report, and can be seen by remote image in Figure 1 below.⁵⁴

⁵² Chapter 3 provides more detailed information on the nature and extent of these health and environmental problems.

⁵³ Most of the LBOD structures were funded as a classic investment project started in 1983. The LBOD system was not completed by the closing date of the Credit financing the LBOD Project (1997), however, and the remaining work was included in the NDP Project See Chapter 2 B 1 for further analysis of this issue.

⁵⁴ The satellite remote sensing figures in this Report are Landsat images from Geocover datasets.

Figure 1: Remote Sensing Image of Location of Tidal Link and Connecting Creek and Dhands Wetland Systems



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link; white line is border between Pakistan and India; yellow lines are roads)

43. The LBOD system, and its relationship to the NDP Project, is highlighted as a central concern in the Request. As described in more detail in Chapter 2, the LBOD system has supported increases in agricultural productivity⁵⁵ but has also led to significant adverse effects on health and the environment in certain areas of southern Sindh.
44. A major source of these adverse effects was the failure of the Tidal Link. As indicated in Figure 1, the Tidal Link runs through the interconnected wetland or dhands of southern Sindh. It was designed to prevent LBOD saline effluent (with residual agricultural chemicals) from flowing into the Rann of Kutch⁵⁶ by channeling it instead directly into the Arabian Sea. It also included design elements, such as the

⁵⁵ See Management Response, ¶ 31, noting benefits to Sindh agriculture and livelihoods of the LBOD.

⁵⁶ The Rann of Kutch is also referred to as Runn of Kutch.

Cholri Weir,⁵⁷ intended to maintain the existing balance in the water flows and the ecology in the surrounding dhands.

45. With the failure of Tidal Link structures (see Chapter 2), the dhands have become part of the tidal system of the Arabian Sea with daily water level fluctuations and much more saline water. Even when functioning as designed, the LBOD and Tidal Link structures altered water flows important for grazing areas and the surrounding communities east of the embankments. The construction of the Tidal Link increased the risk of dangerous flooding and sea water intrusion. Its failure led to many significant consequences on local people, their agricultural and grazing lands, fisheries and internationally recognized wetlands and associated wildlife (see Chapter 2).
46. The Chotiari Reservoir is another integral component of the irrigation and water systems in the Basin that is mentioned in the Request. The work on this component, located in Sindh Province, was mostly completed under the LBOD project, with the remaining work included for completion as part of the NDP Project.⁵⁸
47. The inundation area of the reservoir is indicated in the Map attached to this Report. It covers the homes and lands of thousands of people, some of the richest grazing lands in Sindh and economically important fisheries, and also affects two natural reserves which are habitat for a variety of rare and endangered wildlife species.⁵⁹
48. The NDP Project continues the irrigation and drainage work in the Basin. It has supported a variety of actions that have affected, or may affect, agricultural productivity but also social and environmental conditions. At appraisal, the Project called for planning, research, institutional reform and additional infrastructure investment, including completion of the LBOD system and the Chotiari embankments and reservoir. The original amount budgeted for investment under the Project was US\$683.1 million, indicative of the scale of investment contemplated. The Project also was designed to lay the groundwork for the “*long-term solution*” to drainage problems, including (originally) for the construction of a major northward extension of the LBOD. This northward extension was referred to as the National Surface Drainage System (NSDS) and, informally, as the new “*drainage superhighway*”.⁶⁰

⁵⁷ This is an anchored 1800 foot concrete-crested retaining-wall in the Tidal Link embankment at the Cholri Dhand, intended to handle inflows and overflows. Technical design problems of the LBOD and Tidal Link are reviewed in Chapter 2.

⁵⁸ While the Bank did not fund this component of the Project after the Borrower’s rejection of the Framework for Land Acquisition and Resettlement (FLAR), funding was provided from other sources as part of the overall NDP Project. The Bank as lead donor agency continued to have an obligation to supervise the resettlement component of the Chotiari Reservoir. See Chapters 3 and 4 of this Report.

⁵⁹ There are conflicting data of affected families. According to Government estimates, the number of affected herdsmen families is 178, farmers’ families are 205, while fishermen families are only 21 in the premises of the reservoir. However, the Makhi Welfare Organisation (MWO), a local NGO, estimates the number of affected herdsmen families in the area to be 382, farmers’ families 246, landowner families around 127, and fisherman families around 211. One whole village may have been overlooked in the compensation process, Deh Dubi. A petition started in the Courts of Sindh in 2002 (Chando 2003). The Panel has been informed by Management that as of May 2006 the reservoir has not yet filled.

⁶⁰ The long-term approaches originally were set forth in the NDP Framework Program (1995-2020). This Program appears to have been updated by the Drainage Master Plan (DMP), as discussed in this section of the Panel’s Report.

49. As described in this Report, the Project evolved during implementation. Actions were taken to reinforce local institutional capacity, with the important goal of improving and making more equitable and efficient the overall water delivery and distribution system. Progress on this front, however, was slower than hoped. A decision was made not to attempt to repair the breakdown of the Tidal Link, but rather to carry out related mitigation and monitoring actions. Many of these, however, appear not to have been implemented.
50. The Project also supported substantial investment, including work to complete the LBOD. At the same time, the overall level of investment originally planned was scaled-back significantly, and Management reports that the northward extension of LBOD will not take place under the NDP Project.
51. While abandoning some of the original targets, the Project continued to support the planning process for the future organization of the drainage system and its eventual expansion. The draft Drainage Master Plan (DMP) developed under the Project in August 2004 proposed the Trans-Basin Outfall Drain (TBOD) as a “main component” of the DMP. An international Panel of Experts referred to the TBOD as the NSDS proposal but with a different name.
52. The final DMP, released as the Panel was finalizing this Report, proposes regionalized solutions to drainage management and appears to make significant changes from the draft DMP. Of particular relevance to this Report, the final DMP makes little reference to a northward extension of the LBOD along the lines of the TBOD or NSDS. The Panel understands this to mean that such proposals are no longer being planned. On the other hand, an annex refers to “*construction of the TBOD*” and another part of the DMP states that the situation for the earlier NSDS proposal has become more environmentally “*promising*”. **The Panel considers that clarification as to the meaning of these references and the status of these proposals is of high importance in light of the concerns of the Requesters.**⁶¹
53. The final DMP separately includes major new drainage proposals that would appear to increase substantially the flow of effluent into the LBOD from sources within Sindh province. The estimated overall cost of the DMP investments and actions is Rs.125.981 billion, over half of which is allocated to Sindh Province.⁶²
54. Several elements of this discussion may be highlighted, and will be considered in more detail in later sections of this Report. The first is the decision, reported by Management, not to extend the LBOD system northward under the NDP Project. At the same time, the Project has: funded substantial actions to complete the LBOD, a system already causing significant adverse impacts to Requesters; taken a decision not to repair the LBOD Tidal Link; and supported the development and finalization of proposals for additional drainage actions embodied within the DMP. These latter DMP proposals present another major effort to chart action to address drainage problems in the Basin. These proposals are intended to further support agricultural productivity, but they also bring with them the risk of more displacements and harms

⁶¹ The exact text and meaning of these statements is considered in more detail later in this Report.

⁶² Drainage Master Plan of Pakistan, (DMP), Chapter 6, p 189. The total amount converts to over US\$2 billion based on exchange rates at the time of the drafting of this Investigation Report.

to people and the environment at the tail-end of the drainage system, in southern Sindh.⁶³

55. In this context, the section below provides an overview of the NDP Project, with a focus on the Project as set at appraisal. Chapter 2 provides a more detailed discussion of the history of the Project, implementation actions under the Project, and how the Project evolved during implementation. Chapter 2 also reviews the development and technical design of the LBOD system, and its impacts on people and the environment, in light of its close relationship with the Project and the concerns of Requesters.
56. Chapters 3 and 4 set forth the Panel's findings as to whether the Bank has complied with its own environmental and social safeguard policies in the design and implementation of the NDP Project, taking into consideration the relationship between the Project and the LBOD. The analysis reviews the application of policies on environmental assessment, natural habitats, indigenous peoples, cultural property, involuntary resettlement, emergency assistance, and disclosure of information. It gives particular attention to key areas of concern for Requesters, including those noted above.
57. Chapter 5 focuses on whether the Bank has properly met its supervision responsibilities during Project implementation. Among other things, it reviews questions of compliance in relation to the Bank response to the collapse of the LBOD Tidal Link structures, taking into consideration that the Project encompassed completion of the LBOD system, and the corresponding effects on people and the environment linked to this collapse.
58. In cases where non-compliance is identified, the analysis considers how such non-compliance affected, or might have affected, the trajectory of the Project, the Requesters and the people they represent.

C. The NDP Project

1. The Project as Originally Approved

59. On December 16, 1997, the International Development Association entered into a Development Credit Agreement with the Islamic Republic of Pakistan providing for a credit in an amount equivalent to SDR198,600,000⁶⁴ for the NDP Project, also referred to in this Report as the "Project". In addition to the Association's credit, the Project's financing structure included a loan from the Asian Development Bank (ADB) and a loan from the Japan Bank for International Cooperation. The Bank approved the Project on November 4, 1997. According to the Legal Agreement, the Project was expected to be completed by June 30, 2004.⁶⁵ The closing date of the credit was later extended to December 31, 2004. The NDP Project was launched in January 1998.

⁶³ See Chapters 3 and 4 of this Report.

⁶⁴ SDRs are Special Drawing Rights; SDR198,600,000 is equivalent to about US\$ 285 million.

⁶⁵ Development Credit Agreement (National Drainage Program Project) between the Islamic Republic of Pakistan and International Development Association, Credit No. 2999-PAK, UN Registration No. 34675, dated December 16, 1997, Schedule 2 (Project Description).

60. The NDP Project, a six and one-half year program designed as a Sector Investment Program (SIP), was conceived as the first phase of the NDP Framework Program (the 1995-2020 “NDP Framework Program”). According to the Staff Appraisal Report (SAR), the original objective of the Project was *“to implement the first phase of the Borrower’s and Provinces’ 25 year NDP which is designed to minimize saline drainable surplus, and facilitate the eventual evacuation of all saline drainable surplus from the Indus Basin to the Arabian Sea, and thereby restore environmentally-sound irrigated agriculture to Pakistan.”*⁶⁶
61. Preparations for NDP started in 1993 with the preparation of feasibility reports. The goal of NDP was to implement the first phase of GoP’s 25-year NDP Framework Program. The objectives of the Project were to improve the efficiency of the irrigation and drainage system in Pakistan, and ensure its sustainability, by: (i) establishing an appropriate policy environment and institutional framework, and strengthening the capacity of sector institutions; (ii) improving sector policies and planning; (iii) strengthening the technical foundations of and knowledge base on irrigation and drainage; and (iv) improving the irrigation and drainage infrastructure network.
62. The NDP Project had nationwide coverage and a strong emphasis on institutional reforms. Within a multi-donor effort (total cost of US\$785 million), donors provided US\$525 million of which the Bank provided US\$285 million. The planned activities of the Project are described in the SAR.⁶⁷ They consisted initially of the following components:
- **Sector Planning and Research:** including funds for capacity building and technical assistance to carry out policy-oriented and sector planning studies, and research - **US\$25.7 million.**
 - **Institutional Reforms:** including actions to reform water sector institutions through strategic reorientation, streamlining and restructuring, and capacity building and training; decentralizing Provincial Irrigation Departments (PIDs) and converting them to Provincial Irrigation and Drainage Authorities (PIDAs), and establishing pilot Area Water Boards (AWBs) and Farmers’ organizations (FOs) - **US\$57.7 million.**
 - **Investment:** including rehabilitation, improvement and construction of drains. Sub-projects include construction of on- and off- farm drainage, rehabilitation and modernization of irrigation systems, operation and maintenance actions, and investments to complete the remaining work on the LBOD - **US\$683.1 million**
 - **Program Coordination and Supervision:** including coordination among different entities involved in the irrigation and drainage systems - **US\$18.5 million.**
63. The level of funding provided by different sources for the NDP Project is set forth in Table 1 below.

⁶⁶ Staff Appraisal Report (SAR), Pakistan, National Drainage Program Project, September 25, 1997, ¶ 2.1.

⁶⁷ SAR (NDP), Chapter 2.

Table 1: Sources of Funding for NDP Project (US\$ Million)

Financier	Type of Expenditure		Total	
	Local	Foreign	Amount	%
Borrower and Provinces	208.1 ⁶⁹	19.8	227.9	29.0
Farmers through Farmers' Organisations	19.5	12.6	32.1	4.1
Asian Development Bank	84.5	55.5	140.0	17.9
Overseas Economic Cooperation Fund ⁶⁸	56.6	43.4	100.0	12.7
International Development Association	198.0	87.0	285.0	36.3
Total	566.7	218.3	785.0	100.0

Source: SAR (NDP)

64. According to the SAR, IDA's US\$285 million would constitute 42 percent of the project costs net of taxes, or 36 percent of total costs including taxes. IDA would finance 40 percent (US\$87 million) of the direct and indirect foreign exchange costs, and 35 percent (US\$198 million) of local costs. IDA's financing would serve the following components: 32 percent of the Investment component (US\$219.1 million equivalent); about 100 percent of the Sector Planning and Research component (US\$25.7 million equivalent); about 48 percent of the Institutional Reform component (US\$27.5 million equivalent); and about 69 percent of the Program Coordination and Supervision costs (US\$12.7 million equivalent).⁷⁰

2. Project Modifications

65. During implementation, the Project took a number of actions on planning and research, and to reinforce local institutional capacity for management (e.g., establishment of Area Water Boards and Farmers Organizations). These efforts were designed to promote improved consideration of environmental problems and achieve more equitable delivery and distribution of water in the region. Management notes, at the same time, a slow pace of progress in these efforts.
66. As described in more detail in Chapter 2, the Project's planned investment actions evolved over time, and were scaled-back significantly. While substantial progress was reported in completing the LBOD system, a decision was taken not to continue the planning for the NSDS (drainage superhighway) under the Project. At the same time, the Project supported the development of a new Drainage Master Plan which contains significant new proposals for drainage management and drainage investments, and appears to revise the 1995-2020 NDP Framework Program
67. A more detailed discussion of NDP Project implementation, and the nature of the response by the Bank to breakdowns in the LBOD Tidal Link structures, is provided in Chapter 2.

⁶⁸ The Overseas Economic Cooperation Fund (OECF) was established on March 16, 1961, to promote Japan's overseas economic cooperation by providing concessional funds for industrial development and economic stability of developing countries. On October 1, 1999, OECF merged with the Export-Import Bank of Japan (JEXIM) to form the Japan Bank for International Cooperation (JBIC).

⁶⁹ This figure includes taxes and duties (US\$103.3 million).

⁷⁰ SAR (NDP), p.21.

D. The Investigation

68. The purpose of the investigation was to examine whether the Bank failed to comply with its policies and procedures in the design and implementation of the NDP Project, including the components of the LBOD that are financed by the NDP Project, and whether any such failures, if they occurred, have harmed or are likely to harm the Requesters and the people they represent.
69. Panel Member Mr. Werner Kiene led the investigation. The Panel conducted a two-part investigation. The first part involved detailed research into Bank records related to the Project, interviews with Bank Management and staff, and a review of other relevant documents. The second part took the form of an in-country fact-finding visit. Four internationally recognized experts assisted the Panel in the investigation in their respective fields: Dr. Peter Droogers, expert in integrated water resources management; Dr. Robert Goodland, tropical ecology; Dr. Charles Mehl, expert in social and cultural aspects of development in South and Southeast Asia; and Dr. Hans Wolter, expert in water management, agricultural water use and hydraulic construction.
70. Panel Chairperson Edith Brown Weiss, Panel Member Werner Kiene and Panel Member Tongroj Onchan, accompanied by Operations Officer Serge Selwan and the four expert consultants visited Pakistan in May 2005. During the visit, the Panel met with Requesters and other people in Project-affected places, Government authorities and officials, Bank staff and others.



Picture 1 Discussions with NGO Experts



Picture 2 Panel Meeting with Local Community

71. The Panel interviewed Bank staff in Washington and in the Bank office in Islamabad, before visiting the Project-affected areas. In its investigation, the Panel identified and carefully reviewed all documents relevant to the case that the Requesters, Bank staff and other sources provided to the Panel. The Panel also analyzed other evidence gathered during the field visits or otherwise in its research, including scholarly literature.
72. This Report presents the results of the Panel's investigation regarding the different issues and concerns that the Requesters raise in their submission.

E. Bank Operational Policies and Procedures Applicable to the Project

73. In assessing the application of Bank operational policies and procedures, the Panel found it important to examine the relationship between the NDP Project and the LBOD. The Panel recognizes that the LBOD *project* closed in 1997, but notes that completion of the LBOD *system* and the Chotiari Reservoir were carried forward into the NDP Project. **The Panel notes that an analysis of compliance and harm relating to the NDP Project requires consideration of inter-related elements of the LBOD system and, as relevant to the present circumstances, the Chotiari Reservoir.** The Panel notes that the Project included the task of completing the LBOD system, and has advanced proposals to expand it significantly. This work depended on the functioning of the LBOD Tidal Link. **As a result, the Project inherited the related task of responding to the environmental and social implications of the breakdowns in the LBOD Tidal Link that have occurred during the course of the Project.**

74. With respect to this Project, the Panel assessed whether the Bank complied with the following applicable operational policies and procedures:

- Environmental Assessment OD 4.01 (October 1991)
- Natural Habitats OP 4.04 (September 1995)
- Indigenous People OD 4.20 (September 1991)
- Involuntary Resettlement OD 4.30 (June 1990)
- Management of Cultural Property OPN 11.03 (September 1986)
- Project Supervision OD/OP/BP 13.05 (March 1989 and July 2001)
- Disclosure of Information BP 17.50 (March 1994) and World Bank Policy on Disclosure of Information (June 2002)
- Emergency Recovery Assistance OP 8.50 (August 1995)

Chapter 2: Project History, Design and Impacts

75. The Request, in addressing specific problems of the NDP Project and the LBOD, also refers to water management of the Indus Basin as a whole (see Chapter 1). Hence, a brief description of past actions, developments, and their interrelations with the NDP Project in terms of water management and drainage is appropriate.
76. To this end, this Chapter reviews the historical, factual and technical setting for the NDP Project. It begins with an introduction to the development of irrigation and drainage structures in the Indus River Basin. It then reviews key initiatives and policy debates relevant to drainage problems in the Basin, and how these provided the backdrop for the design and implementation of the NDP Project.
77. The Chapter then provides a more detailed review of key aspects of the LBOD project and system and the NDP Project. The discussion of the LBOD focuses, in particular, on design issues in the construction of the LBOD system that have had major implications for the handling of the NDP Project, and for the lives, livelihoods and environment of the Requesters. The discussion of the NDP Project provides further details on the evolution of the Project over time in light of, among other things, issues and problems linked to the LBOD.

A. Irrigation and Drainage Structures in the Indus River Basin

1. Irrigation Structures⁷¹

78. Irrigation in the Indus Basin has a long history, stretching back to Indus civilizations of over four thousand years. For centuries, irrigation in the Indus Valley was small-scale and localized, some perhaps as early as the Harappan civilizations of the 3rd millennium B.C.⁷² Large-scale extensive irrigation systems were developed under the Mughals and their tributary states (such as the Kalhora and later the Talpur dynasties in the Sindh) in the 18th and early 19th centuries.⁷³ The British Raj built upon the irrigation networks of the Mughals to create the extensive canal irrigation of the Jumna, Ganges, and Indus river valleys during the late 19th and early 20th centuries.⁷⁴
79. The Indus Valley contains the largest contiguous irrigation network in the world. This network led to the opening of vast areas of new farmland in the Punjab and Sindh. Punjab soon became the “granary” of India, providing much of the wheat that is the

⁷¹ The discussion in this section draws extensively from material prepared in the context of the World Bank’s Pakistan Country Water Resources Assistance Strategy - Water Economy: Running Dry (Water CAS), (Report No. 34081 -PK) November 22, 2005, M. N. Bhutta and Lambert Smedema, “Drainage and Salinity Management” Background Paper No. 16.

⁷² A.L. Basham, *The Wonder That Was India*, 1954 (1959 Edition), NY: Grove Press, p. 18.

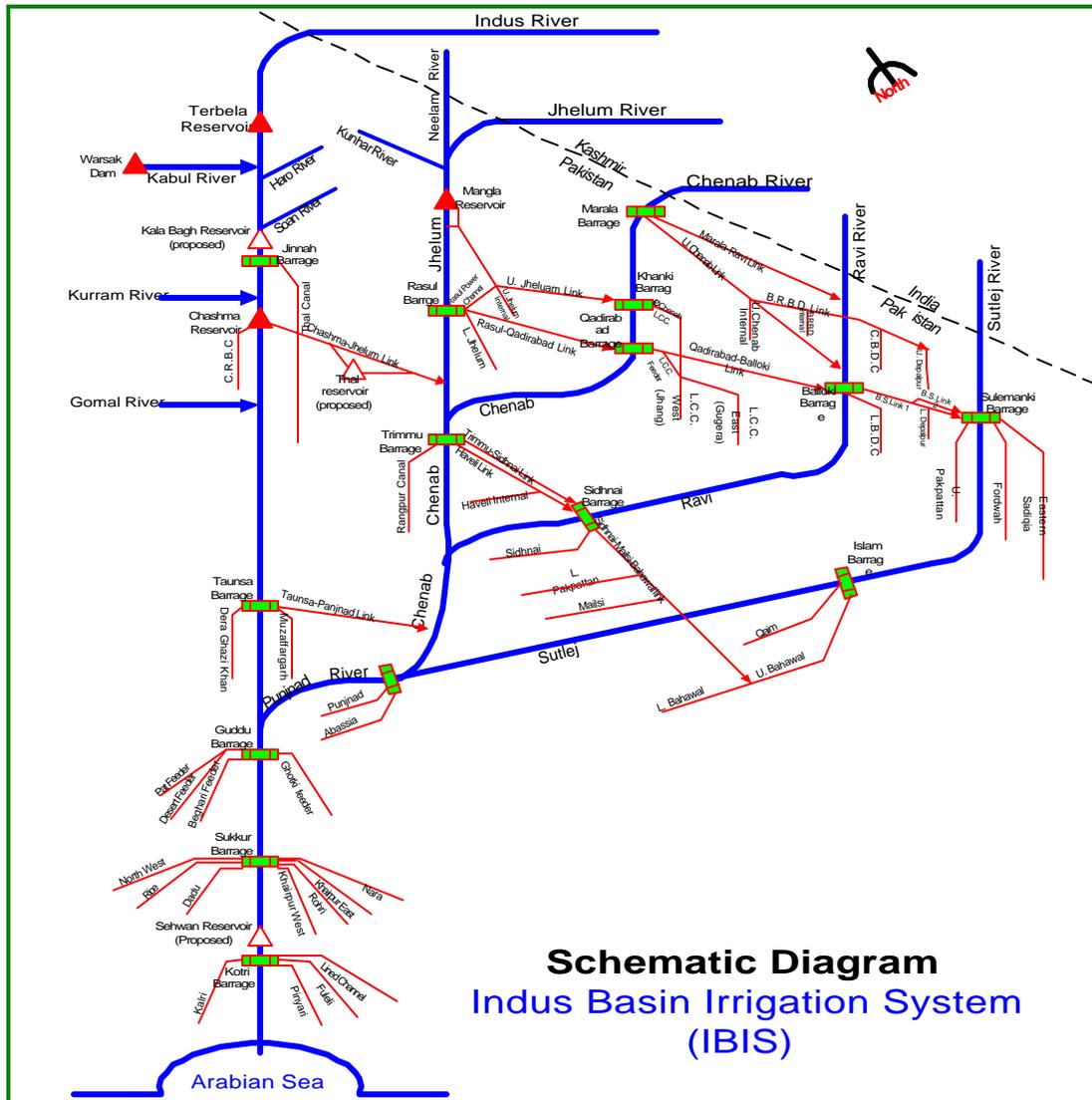
⁷³ H.T. Lambrick, *Sind: A General Introduction*, 1986, Hyderabad/Jamshoro, Sind: Sindhi Adabi Board, Third Edition, pp. 193-194.

⁷⁴ See Lambrick, pp. 193-194. See also Stephen Philip Cohen, *The Idea of Pakistan*, 2005, Lahore: Vanguard Books, p. 21

staple of the north Indian diet.⁷⁵ In 1960 the Indus Water Treaty formally partitioned the Indus water between Pakistan and India, with Pakistan acquiring the rights to the Indus, Jhelum, and Chenab rivers. The World Bank has been the principal donor supporting the construction of the major water works (link canals, barrages, storage reservoirs) once the Indus Water Treaty had taken effect. The Bank further supported development of irrigated agriculture and drainage in Pakistan during the nearly six decades since independence.⁷⁶

80. A schematic representation of the present irrigation structures in the Basin (not including drains, such as the LBOD), is provided in Figure 2 below.

Figure 2: Engineering Schematic: Indus River Basin Irrigation Structures



Source: Water CAS, “Drainage and Salinity Management,” Paper No. 16. Note: the Requesters generally live in the area below the Kotri Barrage (near the bottom of this figure).

⁷⁵ Percival Spear, *India, A Modern History*, 1961, Ann Arbor: The University of Michigan Press.

⁷⁶ SAR (NDP), p. 9.

81. Early irrigation relied on inundation canals which watered narrow strips along the river banks during the flood season. Construction of barrages and reservoirs made the diversion of more river water possible and more land was irrigated. In particular irrigation expanded during the Kharif (summer) growing season. The Tarbela storage reservoir, completed in 1976, added some 50% to available river water. The water diversions vary per year, depending on the rainfall in the Himalayas and available storage.
82. The extensive use of groundwater for irrigation started with the installation of public tubewells⁷⁷ in the 1960's, soon to be followed by the explosive development of tubewell installation by private farmers (some 700,000 at present and still growing at annual rate of 1-2%). The annual groundwater abstraction has increased to 64 billions cubic meters (bm³)⁷⁸ which compares to an estimated groundwater recharge of about 74-80bm³ mainly consisting of the water losses of the irrigation system.
83. Available irrigation water of the country is 136.9bm³ on average. Given that the current command⁷⁹ area is 16.68 million hectares, the gross irrigation duty is 820mm. Rainfall retained in the root zone effectively adds an estimated 200-300mm to the crop water availability in the North and some 50mm in the South. In view of the high evapotranspiration and severe salinity environment under which the irrigated agriculture in the Indus plains is organized and practiced, the available water is not sufficient for basin wide, year round high intensity cropping. Pakistan is rapidly becoming a water stressed country.
84. The extent of the areas equipped for irrigation has been increased gradually over the last 50 years, but has been more or less stable since 1990. However cereal production is still on the rise as a result of higher yields through better water-salt-crop management.
85. There is considerable variation in irrigation water availability within the Basin, caused by differences in river water allocation between the provinces and canals, regional differences in fresh groundwater availability, and inequity in the water distribution within the commands. A persistent problem for agricultural production is the unequal water distribution along branch canals and distributaries leading to water losses in upstream areas and salinity problems in downstream areas and a lower agricultural productivity than could be obtained with good water management.

2. Problems of Waterlogging and Salinity

86. The irrigation structures developed in the Basin have made water more available for the benefit of agriculture, but also led to significant problems of waterlogging and salinization of the irrigated lands. The first signs of these problems (soon widely named the *'twin problems'*) of the Indus Basin were reported in 1851 in the Western Jammu Command, followed by similar reports from other Punjab commands.

⁷⁷ Tube wells are small diameter holes drilled in the ground to abstract water from an aquifer.

⁷⁸ Indus Associated Consultants Ltd and Louis Berger International Inc, National Surface Drainage System, Pre-Feasibility Study, Final Report, Executive Summary, May 2003, page S-16.

⁷⁹ An irrigation command is the potentially irrigable area of an irrigation system. In the strict sense, the term describes the area that can be irrigated by gravity from a canal (the area that is under command).

87. Technical information regarding the nature and levels of waterlogging and salinity in the Basin is provided in Annex 1, Part A. Several key aspects are highlighted below:
- Data from monitoring of rising groundwater tables across Punjab has registered one of history's largest human-induced hydrological regime changes.
 - The percentage of irrigated lands that were waterlogged reached its maximum extent in the 1970-80's, when up to 20-30% of those lands in the Indus Basin were reportedly under serious threat. Recent waterlogging and salinity statistics, however, indicate that the past trend of annually increasing areas has come to a halt and in large parts of the Basin has even reversed. While most of this reversal may be attributed to the various preventive and remedial measures undertaken in the past, the reversal is also partly due to the prevailing drought conditions of the last 4-5 years.
 - Especially the extent of the waterlogged area has decreased, with currently only some 10% the land being classified in the seriously affected category (pre-monsoon groundwater table depth of < 150 cm). The impact of the remedial measures and drought conditions has been less apparent in the salinity statistics. Most of the waterlogged and salinity affected area is located in Sindh province.
 - The salts occurring in the Indus River Basin are of various origins, including fossil salts, marine salts and Indus River irrigation water which imports salts.
 - Levels of salinity vary substantially both between and within regions. Most of the groundwater in the higher rainfall and naturally better drained lands of the upper basin is fresh groundwater. Pockets of saline groundwater occur but these are mostly confined to the central parts of Doabs (tract of land between rivers), to areas near saline rocks and to the desert fringes. The occurrence of saline groundwater becomes more prevalent towards the middle and lower parts of the Basin where almost all groundwater in the deltaic zones near the sea is highly saline (with the exception of small fringes along the rivers and canals). In some parts of the saline groundwater zones with good drainage and heavy fresh water recharge, thin fresh water lenses may be found on top of the deeper saline groundwater. With careful pumping regimes these lenses may be used for irrigation and/or drinking water supply.
88. Further analysis of problems of salinity in southern Sindh province in particular, and the corresponding affects on people and the environment, is provided in later sections of this Report (see especially Chapters 3 and 4).

3. Technical Remediation Actions

89. Over the years, a number of technical remediation measures have been applied to attempt to resolve the "*twin problems*". Technical experts considered that rising water tables and related waterlogging and salinity problems were due to groundwater recharge exceeding the groundwater drainage. In this light, most response measures were aimed to restore the groundwater balance.

90. The measures applied included actions to: reduce canal seepage losses; reduce on-farm deep percolation losses; improve surface drainage; drain groundwater by tubewell pumping and drain groundwater by pipe drainage. Additional information regarding these types of measures is set forth in Annex B, Part B.

4. Policy and Institutional Measures

91. For many years, it was generally considered that the waterlogging and salinity problems and the underlying shortcomings in the drainage technology and in drainage and salinity management were mostly of a technical nature and called for technical interventions. More recently, increasing emphasis has been put on addressing these shortcomings through appropriate policies and institutional reforms. This is reflected by the institutional and policy components of the NDP Project and its emphasis on issues of water management and use.
92. These measures included, among others, irrigation management-related measures, subsidies, and pricing interventions. Additional information on these measures is set forth in Annex B, Part C.⁸⁰

B. Major Initiatives and Actions

1. The Left Bank Outfall Drain (LBOD)

93. As described above, the “*twin problems*” of waterlogging and salinity were considered increasingly as the principal threat to the sustainability of irrigated agriculture in the Indus Basin. Since the 1960s, many plans have been developed to respond to the challenge. A drainage outlet to the sea has been raised repeatedly as a necessary element of the solution to waterlogging and salinity issues in the Indus River Basin Irrigation System (IBIS).
94. The LBOD system is a major element of the irrigation and drainage structures developed in the Basin to address these problems. The Project to build the LBOD system, known as the LBOD project, began on December 13, 1984, when IDA approved a Credit of US\$150 million. The LBOD project built upon a spinal drain that had been constructed by WAPDA before 1984. The LBOD project was a classic investment project with physical infrastructure objectives and a confined area. The total LBOD project cost at appraisal was about US\$636 million.
95. The LBOD project focused on Sindh Province. The principal project components included: (a) completion of a 300km outfall drain and remodeling of existing drains to dispose of saline effluent to the Arabian Sea; (b) installation of a surface and subsurface drainage network in the three sub areas; and (c) installation of a power distribution system to supply the drainage tube wells and drain pumps. The LBOD project further provides for: (d) introduction of on-farm water management practices including renovation of about 920 watercourses and precision land leveling; (e)

⁸⁰ For further reading see World Bank, Pakistan Public Expenditure Management, Volume II, Accelerated Development of Water Resources and Irrigated Agriculture, September 2003.

remodeling of the Nara and Jamrao Canals, as well as construction of the Chotiari Reservoir, to provide supplemental irrigation water for the project area; and (f) technical assistance for project design and implementation.⁸¹

96. The central feature of the LBOD system is the spinal drain, which connects the drainage network of three districts in upper Sindh to the sea through a Tidal Link. The LBOD spinal drain collects surplus drainage and distributes it through a weir to two branch drains, the Kadhan Pateji Outfall Drain (KPOD) and the Dhoro Puran Outfall Drain (DPOD). At the junction of KPOD and DPOD a weir is constructed to limit the flow to DPOD to 57 m³/s and to exclude very saline effluents. The KPOD connects to the sea via a 26-mile long canal, referred to as the Tidal Link (see Map attached to this Report). The breakdown of this Tidal Link in the late 1990's and subsequent years, and the question of whether this breakdown was adequately addressed under the NDP Project, is addressed in detail in later sections of this Report.
97. On December 31, 1997, the LBOD project closed. Some works of the LBOD system were not, however, completed by the closing date. These outstanding components were transferred to the NDP, as described above and as stated in a press release dated August 7, 1997, “[t]he LBOD project will close in December this year and remaining works will be financed under the National Drainage Programme (NDP) project which will begin later this year, subject to approval from the World Bank’ Board of Executive Directors this fall (...).”⁸²

2. The NDP Framework Program (1995-2020)

98. During the period of development of the LBOD project, in the 1980's-early 1990's, there was a widespread consensus between Pakistan and its principal donors that the lack of effective drainage for the whole Indus Basin Irrigation System (IBIS) was the principal threat to the sustainability of the country's irrigated agriculture and that it demanded an urgent solution.
99. An entire range of indicators confirmed the failure of the past strategy in addressing the underlying causes of the ills of the IBIS while the performance and environmental indicators continued their deterioration. Therefore, in 1992, the Bank stopped all new lending to the sector pending the formulation and agreement with the Borrower on a new strategy that addressed the underlying causes the problems, rather than manifest symptoms.
100. As part of the change of direction and strategy, the Government of Pakistan (GoP) and the Bank agreed to close eight projects between FY92 and FY94 and restructure the rest. A Drainage Sector Environmental Assessment⁸³ was prepared in 1993 that described the new strategy called National Drainage Program (the “NDP Framework

⁸¹ Staff Appraisal Report (SAR), Pakistan: Left Bank Outfall Drain Stage I Project (LBOD), November 5, 1984, ¶ 3.02.

⁸² World Bank News Release No: 98/1436 (Left Bank Outfall Drain Project Tackling Pakistan's Waterlogging and Salinity Problems), August 7, 1997, at <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/>.

⁸³ Pakistan Drainage Sector Environmental Assessment (DSEA) – National Drainage Programme, Main Report Volumes 1-4, June 1993, [hereinafter “DSEA June 1993”].

Program”).⁸⁴ The goal of the NDP Framework Program was to solve the drainage problem permanently by minimizing saline drainable surplus water, and facilitating the eventual evacuation of all saline drainable surplus water from the Indus Basin to the Arabian Sea, and thereby restoring environmentally-sound irrigated agriculture in Pakistan. The GoP confirmed its commitment to the principles and the objectives of the program in letters to the Bank of August 21, 1995 and October 3, 1995.⁸⁵

101. The NDP Framework Program is a 25 year framework program formulated by the Borrower to address saline drainable surplus in the Basin. It appears to be more a strategy than a defined program, and is described in the Drainage Sector Environmental Assessment (DSEA) of 1993. This framework is being updated by the Drainage Master Plan (DMP).⁸⁶

3. The National Surface Drainage System (NSDS)

102. The consultants who carried out the DSEA were required to evaluate various disposal options to deal with the salinity. They concluded that constructing an outlet to the sea was the only viable solution and neither avoidable nor postponable. The pre-feasibility study on NSDS⁸⁷ (the drainage superhighway) and the draft DMP,⁸⁸ in line with this view, further developed the trunk drain concept. Little attention was given to the analysis and development of other alternatives, nor to the potential negative impacts of such a system on affected populations that are not irrigation water users in southern Sindh.⁸⁹ The NSDS, as shown in the SAR, is illustrated in a dotted line in the Map attached to this Report, extending from the LBOD system northward through Sindh Province and into Punjab Province.
103. Notwithstanding the many studies, the overall architecture of an integrated irrigation and drainage system did not emerge. While the Bank supported the NSDS study under the NDP Project, there were increasing concerns that a focus on effluent removal was inadequate and that an integrated view of the irrigation and drainage system was required. The Bank therefore decided that under the NDP Project no new drainage infrastructure would be financed unless a drainage master plan had been prepared and agreed upon. The GoP responded to these concerns and proposed the DMP as an additional activity during Mid-Term Review. The Bank accepted the proposal
104. As described above, work on the DMP started in 2002 parallel to the NSDS pre-feasibility study. At the request and initiative of the Bank, an international Panel of Experts (PoE) reviewed both studies.

⁸⁴ See DSEA June 1993, Volume 2. The NDP Framework Program is defined in the DSEA as “Concept Framework for National Drainage Programme.” See also supra Chapter 1 C 1 (The Project as Originally Approved).

⁸⁵ SAR (NDP), p. 12.

⁸⁶ DMP, Volume 2, Main Report, is discussed in more detail in later sections of this Report.

⁸⁷ Indus Associated Consultants Ltd and Louis Berger International Inc, National Surface Drainage System, Pre-Feasibility Study, Final Report, Executive Summary, May 2003, page S-52 to S-62.

⁸⁸ Draft Drainage Master Plan of Pakistan, August 2004.

⁸⁹ The 1993 DSEA, and the adequacy of its analysis, are discussed in more detail in Chapter 3 of this Report.

105. The PoE in its two reports⁹⁰ observed a substantial decline of the drainable surplus and improvements of the salt balance as compared to earlier estimates. It also noted fierce opposition to plans of an integrated drainage system. It recommended a radical shift in ways of disposing of the effluents away from spinal drains and disposal to the sea to local disposal and reduction of drainable surplus.
106. The PoE further recommended that trunk drains would be considered only if alternative approaches such as efficient irrigation management, local stakeholder participation, and local effluent disposal solutions were not found to be adequate. The PoE suggested that integrated irrigation and drainage plans should be prepared for each of the 20 sub-basins using the Drainframe⁹¹ methodology. Work on the full feasibility study of NSDS would be suspended. Management indicates in its Response to the Request that these recommendations were accepted by the Bank and the GoP. The analysis of these issues has been taken up by the DMP. The final version of the DMP appears to have moved away from the trunk-drain expansion concept as a central component of the solution to Pakistan's drainage problem. The elements of the DMP are discussed in more detail in later sections of this Report.

C. LBOD Design and Performance

1. History of the Bank's Involvement

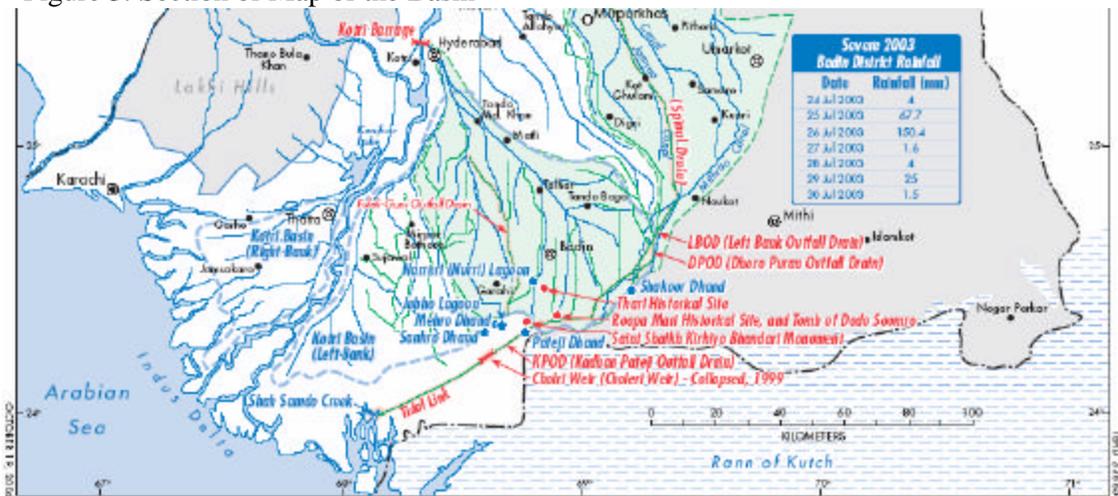
107. In the late 1960s a need was identified for large-scale drainage. The British consulting firm Hunting Technical Services proposed in 1966 the construction of a major drain east of the river Indus, named the Left Bank Outfall Drain – LBOD, to divert saline drainage water and flood flows directly into the Arabian Sea. This was considered necessary because the Indus River flows for much of its southern length on an elevated river bed making it difficult to divert drainage water back into the river without major pumping stations.
108. When the World Bank became involved in 1983, WAPDA had almost completed the lower section of the Spinal Drain (later named LBOD) that it had constructed since 1975 using its own resources. The remaining work of the LBOD project included the completion of the Spinal Drain, the remodeling of the KPOD and the DPOD, the Tidal Link and the drainage works in the three districts Nawabshah, Sanghar, Mirpurkhas and the Chotiari Reservoir.
109. The original concept was modified, however, because of the high costs and the technical difficulties, and a staged approach was proposed: Stage-I of LBOD would extend only to the northern districts of Sindh (Nawabshah, Sanghar, Mirpurkhas) that suffered from severe waterlogging. The design capacity of the drain was determined by the perceived need for storm water drainage. It was estimated at 120 m³/s whereas the saline base flow was only calculated at 35 m³/s. Alternative drainage concepts, such as water management improvements, polders for storm water drainage and

⁹⁰ Pakistan National Surface Drainage System (NSDS) – Panel Consultation, February 2003 and Pakistan Drainage Master Plan (DMP) – Panel Consultation, Review Report, Delft, December 2004 [hereinafter “DMP Panel Consultation, December 2004”].

⁹¹ The Drainframe methodology adopts a basin approach together with a strong focus on water management issues and user participation for the solution of drainage problems.

evaporation ponds, were not explored at that time. The option of a future extension into Punjab (Stage II) was kept open.

Figure 3: Section of Map of the Basin



Source: Management Response

2. Alternative Alignments of the Outfall

110. The most critical element of the LBOD is the last reach when the drain falls out into the Sea. The natural route of the surface flow in lower Badin district is southeast, to the area east of the town of Badin. This area drains into the Shakoor Dhand⁹² and further to the Arabian Sea across the Rann of Kutch. The Rann however was lifted by an earthquake in 1820 and is now about 5ft above medium sea level thus isolating the Shakoor Dhand from the Sea for most of the time except during very high tides. The dhand now acts as an evaporation pond.
111. The LBOD or Spinal Drain that collects the drainage water from northern Sindh had for most of its length been completed in 1980 and ended east of Badin. Only the final reach and the outfall to the Seas were still to be completed. Following the natural route and linking the LBOD with the Shakoor Dhand would have been the most appropriate technical option for the alignment of the drain. However the evaporation capacity of the Shakoor Dhand was limited, therefore a cut through the Rann of Kutch to the Coree Creek would have been required to accommodate the design discharge.
112. Any arrangement to increase the flow of drainage water into the Shakoor Dhand and beyond to the Coree Creek would have required the consent of the Government of India as the Shakoor Dhand area and part of the Rann of Kutch are in the territory of India. Project planners were concerned about the possibility of transboundary environmental damage and the need to avoid activities that could impinge on Indian territory,⁹³ thus adding further weight to the decision to direct the outfall towards the

⁹² Dhands are local expressions for lakes or Lagoons. They contain brackish water and are only temporarily connected to the sea.

⁹³ World Bank Internal Memorandum (Pakistan– Left Bank Outfall Drain Stage 1 (LBOD) Project – International Legal and Environmental Issues), September 23, 1983.

west. **The Panel acknowledges from the record that it was politically difficult to dispose of the drainage water through the Shakoor Dhand.**

113. The Bank eventually accepted the view that the disposal of the drainage water could be solved within Pakistan's territory. The decision not to negotiate with India limited the disposal options to two alternatives:
- Disposal into the Pateji and Cholri dhands with uncontrolled overflow through the Rann of Kutch to the sea (still some possibilities of water overflowing to India), or
 - Construction of a Tidal Link to an active creek on Pakistani territory and direct disposal into the Arabian Sea (with or without a bund to avoid overflow into India).
114. The Pateji and Cholri dhands are relatively large but shallow water bodies of slightly brackish water. Their principal sources of water are the Kotri drains that carry moderately saline water. Located to the northwest of the Rann of Kutch and the southwest of Badin, north of the border with India, they do not have a permanent connection to the Sea but seawater enters occasionally at very high tides. The initial assumption was that in Phase I the volume of drainage water would be quite small and that the dhands could handle this through evaporation. Any overflow would find a natural route across the mudflats and the Rann. The environmental impact on the dhands of the original option was projected to be small and mainly positive because of the lower salinity of the drainage water compared to sea water. The Government of Pakistan favored the first option during that period, mainly for cost reasons.
115. This opinion changed during project appraisal probably because of concerns about relations with neighboring India. There were also concerns that with increased inflow the water level of the dhands would rise and caused flooding of agricultural land and back-up of the water into existing drains, in particular the Serani Drain. Hence, it was decided to construct a Tidal Link from Pateji Dhand to the Sea which would take the drainage water directly to the Shah Samando Creek without causing a back-up of the water level. The Tidal Link was designed as a dug trench through the mud flats and dunes with a small embankment on the Indian side. The idea of separating the dhands from the Tidal Link through an embankment on the northern side emerged only later.
116. In December 1984, when the LBOD project was approved, there was no explicit policy requirement to complete a formal EIA.⁹⁴ In 1988 and 1989, an EIA was arranged rather hastily by the LBOD Consultants.⁹⁵ The study was limited in its scope and focused exclusively on the biological aspects of the environment (fish, birds, mangroves) in line with prevailing thinking at that time.

⁹⁴ Operational Manual Statement (OMS) 2.36, issued in May 1984, identifies among other things: guidelines relating to health and environmental aspects of projects financed by the Bank; organizational responsibilities in the Bank for considering those aspects; environmental components of projects; and review of environmental considerations during the Project cycle. It does not, however, explicitly call for a formal Environmental Assessment (EA) document. OD 4.01 on Environmental Assessment, which does specify requirements for formal EA documents, did not take effect until October 1991.

⁹⁵ Left Bank Outfall Drains Stage 1 Project (LBOD), Environmental Impact Assessment of the Outfall Drain (EIA), February 1989.

117. The study did confirm however, that the dhands had a high ecological value and high biological productivity and diversity. The dhands were recognized as an important staging ground for migrating birds, and as an economic base for a sizable fishing community. Concerns were raised that discharge of saline water and of agricultural pollutants would alter the water quality of the dhands and negatively affect the ecological system. It was therefore proposed to separate the dhands from the Tidal Link through an embankment on the northern side.
118. The EIA Report contains a map showing three options for the alignment of the Tidal Link embankment.⁹⁶ Under Option A the embankment would be built parallel to the drain at close distance. Under Option B the embankment would be built at considerable distance from the Tidal Link and separate the Pateji and Cholri dhands from the Sanhro and Mehro dhands. The purpose of Option C is not quite clear from the drawing. It was probably designed as an embankment with a flood gate.
119. Option A was the least costly solution because the embankment would be shorter and the embankments could be built from excavated soil of the trench without the need for long haulage. However, it would expose the embankment to the tidal current and the flow of the drain. Under Option B the embankments would be constructed in still water from material that had to be hauled. The authors of the study recommended model tests on the different alternatives. The Panel could not determine whether these tests have actually been made.
120. According to the Panel's expert, Option B has elements that could be of value even today in restoring wetland functions of Sanhro and Mehro dhands, and might merit consideration in the context of dialogue and consultations with local communities. At the time the design decision was made, it seems that the least costly solution (Option A) was selected without further consideration or risk analysis
121. During field interviews, people told the Panel that they had warned early in the design process, and repeatedly, about the risk of the Tidal Link and its orientation. They indicated that it was widespread local knowledge that, from the end of the existing KPOD, the Tidal Link takes a south-western route against the prevailing winds and cuts through the existing Pateji and Cholri dhands and through mud flats.
122. **The Panel finds that the selected alignment was politically attractive because it minimized the discharge of water across the international boundaries but it was technically and environmentally risky.** The alternative of disposing the drainage water into the dhands with some overflow into the Rann of Kutch would have left the separation from the Sea and natural protection of mud flats and sand bars intact but could have caused some overflow into India.
123. The Panel's expert notes that the perceived risk of alteration of the ecosystem of the Rann of Kutch through saline water and pollutants, posed by the original option, was probably overstated at least during the initial period when the base flow was low. Before the initiation of the Kotri drainage system around 1965 the inflow to the dhands was much lower and their area correspondingly less. Thereafter Sanhro and

⁹⁶ EIA (LBOD), p. 9.

Mehro dhands received water from a number of outfall drains. Because of this and the restricted connection to the Pateji and Cholri dhands the salinity of these two was low in the order of 3000ppm (salinity of sea water is 35000ppm), whereas the salinity in the Pateji and Cholri dhands was higher (around 15000ppm) because of lesser inflow and the better connection to the sea).⁹⁷ **Hence it could be said that the dhands originally had benefited from the moderately saline inflow of drainage water which created a sort of artificial wetland of high biological productivity.**

124. As has been confirmed by events, the area represented an extremely difficult and hostile environment. In addition, remote sensing data analyzed by the Panel experts confirmed some of the doubts expressed by the local people. Images from before the time of the construction of the Tidal Link proved that the Shah Samando Creek has never served as a drain for the Rann of Kutch or the wetlands.
125. The analysis (see Annex C, Remote Sensing Analysis) also raises doubts concerning the belief that the original option, i.e. draining water into the dhands without a Tidal Link, would have resulted in considerable back-up of water. It seems that the Pateji and Cholri dhands at that time were well connected to the Rann of Kutch and that any excess flow would have found easily a natural route towards the sea via two creeks located east of the Samando Creek without destroying the natural protection of the mud flats, albeit with some overflow into Indian territory.

3. Structural Design

126. The final design of the outfall system was developed by the LBOD Consultants between 1988 and 1989 based on mathematical and hydraulic models and on the results of an environmental impact assessment. The arrangement for the outfall was to widen the existing KPOD and to construct from its end point a Tidal Link of some 45km to connect KPOD to Shah Samando Creek.
127. Embankments on both sides of the channel were provided to separate the Tidal Link from the dhands to the north-west and the Rann of Kutch to the south-east. At the south-west turn of the DPOD a low weir was provided that would avoid the entry of high saline base flow into the Shakoor Dhand but allow diversion of less saline flood flow at high water levels as has been traditionally the case. The use of the storage capacity of the dhands adjacent to the Tidal Link was considered attractive as a means of reducing water level variations and high flow velocities. Therefore an overflow weir adjacent to the Cholri Dhand was provided.

a. Design Criteria

128. The LBOD was intended to evacuate saline base flow and a limited amount of surface flow during storm periods. Base flow from tubewells and subsurface drains was not a determining factor in the design, because the overall water quantity was estimated at only about 35 m³/s. Provision of storm water drainage and the appropriate design criteria was a much discussed issue during design stage. The project area of LBOD Stage-I of about 580,000ha has on the average an annual rainfall of only about 200mm which would

⁹⁷ EIA (LBOD), p. 4.

normally not require surface drainage. However, the rainfall in lower Sindh tends to fall in few isolated events of much greater intensity. It is not uncommon that the total annual rainfall falls in two or three days. These high intensity storms cause widespread flooding and crop loss thus call for appropriate means to remove standing water. Dry-foot crops suffer damage if subjected to standing water for more than five days.

129. Preliminary calculation showed that a surface drainage system that would account for the most severe storms (recurrence interval of about 50 years) would be very expensive and perhaps technically not feasible. Therefore the designers settled on a design criteria of 1.5cfs/mile². This capacity would evacuate the run-off of a storm of 60 mm (equivalent to a recurrence interval of about five years) over the total drainage basin in about five days assuming a drainage coefficient of 0.2.⁹⁸ These design criteria led to a calculated storm flow of about 148m³/s in the lower section of LBOD, against a base flow of 44m³/s.
130. The designers assumed that under storm conditions, people in the region would reduce sub-surface discharges by closing irrigation canals so that the full capacity of the surface drainage network would be available for storm water discharge. It was further assumed that the drains could run for a limited period at full capacity without freeboard⁹⁹ to increase the capacity to 215m³/s. Freeboard is one foot in sub drains, two feet in branch drains and four feet in outfall drains. In order to achieve a controlled run-off from the land into the drain, special drainage inlets were provided to delay flow from the fields into the drains. No provisions were made in the lower Badin area to temporarily store the flood water in polders¹⁰⁰ or agricultural land in case simultaneous high tides in the Sea prevented the run-off of flood water.
131. The Tidal Link was designed for storms with a recurrence interval of about five years. This short interval is not acceptable practice when it comes to the design of works that could potentially lead to the flooding of major structures, settlements and people. The LBOD is such a structure that should have been designed with a much larger safety margin. The engineers by-passed this problem by making assumptions on the operation of the system, as described above, that were unrealistic. The engineers further assumed that the main drains could temporarily be overcharged and that the storm water could be pushed into the sea even against the high tides. This would have required strong and high embankments and control structures at the outlets of the side drains to avoid overtopping and backflow. The structures as designed and built proved to be inadequate for high flow events and simultaneous occurrence of high tides and severe storms.
132. **The Panel finds that the main drain should have been designed with a higher safety margin. The design assumption that people in the region would not release water into the drainage network from inundated lands failed during the July 2003 rainfall.**

b. Analysis of the Technical Design

133. **Hydraulic modeling load assumptions.** The Principal Consultants of LBOD Stage-I project commissioned Delft Hydraulics to perform the pre-design study for Tidal Link

⁹⁸ A drainage coefficient of 0.2 means that 20 percent of the rain-water runs off into the drains.

⁹⁹ Freeboard is the excess height of the river dike before overtopping.

¹⁰⁰ Polders are low-lying areas with restricted utilization for temporary storage of flood water.

and outfall, in order to test the performance (flow velocities, water level fluctuations, scouring and siltation) prior to detailed design. The Delft studies consisted of three components:

- Physical surveys and sample collection.
- Mathematical modeling on a one- dimensional basis of flows, water levels, salinity.
- Physical modeling at Hydraulic Research Station Nandipur and Irrigation Research Institute (IRI), Lahore to demonstrate the effect of tides and drain discharges on levels in existing drains.

134. These studies concluded that the Tidal Link alignment was suitable as the shortest connection between the Kadhan Pateji Outfall Drain (KPOD) and the Shah Samando Creek (the nearest tidal creek in Pakistani Territory) in which water levels vary from +6.5 to -5.5 feet above mean sea level. The water level in the KPOD was perceived similar or below design water levels for most of the conditions with the exceptions of storm flow coinciding with the cyclonic storm in the Arabian Sea. The model tests indicated that under full operational conditions tidal fluctuations would be limited to one foot at a distance of 30 miles up the drain (to approximately RD +6 on KPOD) and that sea water intrusion was limited to 12 miles (to approximately RD -88). This was considered sufficiently far from existing irrigated areas. Under low flow conditions sea water intrusion was not predicted to exceed RD -70.
135. **Embankments.** The Tidal Link was designed as a channel 26 miles long with a constant bed width of 92 feet and a bed level of -17 feet at the outfall.¹⁰¹ It was argued that the chosen depth would reduce critical velocities at the outfall and the possibility of scour under low tide conditions. In order to protect the Tidal Link from potentially high water levels in the Rann of Kutch and to avoid overflow of water into Indian territory a continuous embankment was provided on the southern side. A similar embankment on the northern side ensured separation from the dhands and permitted access for inspection.
136. During project preparation in November and December 1983, consultants collected soil auger samples at approximately 1.8km intervals along the Tidal Link alignment. It is unknown from what depth the samples were taken. Allegedly the samples showed that the soils were generally of stiff cohesive clay with high silt content (85%) and with clay and sand contents of 10% and 5% respectively.¹⁰² During the design phase, a consultant collected auger samples from one meter depth and less to calibrate the model.¹⁰³ Additional borehole samples were taken by another consultant from a 10 foot depth.¹⁰⁴ These samples show a much smaller silt and clay fraction and less cohesive soil. The Panel could not find indications that the contradictions in the geotechnical investigations were discussed.

¹⁰¹ The embankments had a side slope of 1: 3. The bed slope was 1: 14,000 which resulted in a bed level of -17 feet at the outfall in Shah Samando Creek.

¹⁰² Sir M. MacDonald and Partners (MMP), Left Bank Outfall Drain, Stage 1 Project. Project Preparation, Annex 12, Outfall System and Tidal Link. January 1984.

¹⁰³ Delft Hydraulics, Left Bank Outfall Drain stage 1 Project. Pre-Design Study for Tidal Link and Outfall. Volume 1, Report on Survey Activities. Delft March 1988.

¹⁰⁴ Foundation Engineering Ltd, Left Bank Outfall Drain Stage 1 Project. Site Investigation for the Tidal Link. Final Report. Dubai December 1990.

137. Mathematical and hydraulic model studies¹⁰⁵ suggested that the velocities in the mouth and in the lower reach of the Tidal Link could be as high as 1.9 m/s (6.5 ft/s) for extreme design conditions (spring tide and maximum discharge) and actual velocities under normal conditions in certain phases of the tidal cycle would be in the order of 1.2 m/s (4 ft/s). The model also predicted the possibility of siltation in some reaches of the channel.
138. The possibility of bank and bottom scour was recognized in the Delft report. The maximum non-erodable velocity of the prevailing silty/clayey sand that would occur along the Tidal Link channel was established in the order of 0.7-0.8m/s (2.7ft/s).¹⁰⁶
139. **The Cholri Weir.** To avoid draining the dhands but to permit some inflow at high tide and attenuation of peak water levels, an overflow weir was provided in the Tidal Link embankment at Cholri Dhand.¹⁰⁷ The level of this weir was chosen to limit water levels to their seasonal maximum in the dhands. The length of the weir was established using a computer model which considered flows and levels under various conditions of wind and tide. The weir is designed for flow in either direction according to the tidal cycle. It has a crest level of 4.5ft and a length of 1800ft. These dimensions were intended to assure that under the worst storm flow/tidal conditions the water level in the dhands would not exceed 6 feet, which is considerably lower than the design water levels in the incoming Karo Gungro and Fuleli Guni outfall drains (Kotri Drains), thus avoiding back-up of water into these drains.
140. The body of the weir consisted of sheet piles¹⁰⁸ and was designed as an anchored retaining wall with tie rods back to the supporting short sheet pile anchorage wall. The depth of the embedment of the sheet pile wall was established at 11ft based on in-situ and laboratory test of soil properties as determined from the 1990 site investigations.
141. However, the Panel's expert received information that earlier design drawings showed an embedded length of the sheet piling of 17ft against 11ft in the final drawings. The reason for this critical deviation between design and actual depth remained unclear. In addition, no bed armoring was provided at the downstream side of the weir, i.e. the Tidal Link side.
142. **The Panel observes that significant technical mistakes were made during the design of the embankments and the Cholri Weir.** The Panel's expert found that results of hydraulic calculations and model tests were insufficiently incorporated into the design, and that the contradictions of the geotechnical testing were not discussed and reflected in the design. The expert also found that the design of the longitudinal overflow weir should have provided for a proper bed protection.

¹⁰⁵ Delft Hydraulics, Left bank Outfall Drain stage 1 Project. Pre-Design study for Tidal Link and Outfall. Volume 4, Mathematical Model Description, Delft October 1988.

¹⁰⁶ MMP, Morphology of the Tidal Link Post 1996 Monsoon, May 1997, Section 7.3 (quoting Delft pre-design studies).

¹⁰⁷ According to the 1989 EIA of LBOD, the model used to simulate LBOD behavior predicted, under many tidal, meteorological and flow conditions, that "*the water level in the Tidal Link when it passes Pateji and Cholri Dhands will fall below that in the dhands. The dhand system would therefore drain into the Tidal Link channel.*" Because of the levels of the Pateji and Cholri Dhands, in effect "*this would mean almost total drainage of both,*" and major shrinkage of the others. 1989 EIA, pp. 6-7.

¹⁰⁸ Sheet piles are prefabricated construction elements that can be driven into ground to form a retaining wall.

143. **Control Structures.** The possible need for a structure at the outfall, that would protect the drain from high tides, was considered during the design stages but rejected since it was thought to have no significant advantage but several disadvantages. The arguments were that the structure would slow down the evacuation of drainage water from the system, and that the water levels in the Tidal Link would still continue to fluctuate due to backing-up against the closed gates. Sea water intrusion was thought to be limited to some 15 miles upstream (to approximately RD -75) under the worst combination of tides and storms. This is at some distance from agricultural or grazing lands. Furthermore the conditions at the outfall and the possibility of outflanking would lead to an expensive structure. However, it is interesting to note that other consultants¹⁰⁹ proposed the outfall with a bell-shaped mouth and with gates that would close during high tides.
144. The Panel expert found that, at least, provisions for emergency closure of the Tidal Link, such as with stop-logs or concrete slabs, should have been considered once the decision to go forward with the Tidal Link option was made.
145. **Meteorological Risk.** The area of the LBOD and in particular the lower portion is prone to extreme weather. Rainfall in the area tends to occur in few high intensity storms. Statistical data on rainfall probability differ. Some publications indicate¹¹⁰ that the probability of a 5 inches (127 mm) rainfall in 24 hours is three years in five in the Badin area. For the upper districts Mirpurkhas, Sanghar and Nawabshah it is shown to be about two years in five.
146. Although daily rainfall data were not available to the Panel, monthly records of rainfall over 100 years were available. Time series analysis based on these monthly data reveals that the July 2003 rainfall events had a recurrence interval between 6 and 66 years, depending on the station analyzed and whether multi-day or monthly rainfall was considered. More unusual than the amount of rain was probably the fact that the rain covered a wide area.
147. The design criteria of the LBOD system to carry rainfall runoff are based on a five-day event of 125 mm to be discharged in five days. Given the erratic nature of rainfall in the area, it can be assumed that 125 mm in five days can be translated to 125 - 200 mm per month. Using monthly probability analysis of rainfall in the area, a rainfall event of 125 mm per month has a recurrence interval of 1.5 years and an event of 200 mm a recurrence interval of 7.5 years.
148. The Panel observed that the rains in July 2003 were to a certain extent beyond normal risk assessments, but the rains could certainly not be classified as an unusual extreme event.
149. Records and testimony indicate that the Badin area had been frequently affected badly from flooding due to heavy rainfall events before the implementation of the LBOD system. The Panel expert found that given the high frequency of flooding and the associated high rainfall intensity, it is questionable whether sufficient attention was paid to the risk of flooding during the design stage.

¹⁰⁹ Planning and Development Consultants, Design Memorandum on LBOD, 1978, p. 2.

¹¹⁰ M. Panhwar, *An illustrated historical atlas of the Soomra Kingdom of Sindh, 1011-1351 AD*, 2003, Karachi: Soomra National Council, Pakistan.

150. Cyclones are a relatively rarer event; however, they do occur. In the past hundred years about four cyclones have hit the Indus Delta.¹¹¹ The risk of a cyclone has not been considered in the design although a risk of one cyclone in every 25 years is not negligible.
151. **The Panel finds that the LBOD designers made insufficient arrangements in the design to deal with storms of higher intensity.** There have been no provisions for emergency plans, controlled flooding of dedicated areas or flood control gates. In particular, the designers did not consider that the drainage system would convey the flood water down to the low lying areas of the Badin district much more rapidly than in the past. **The Panel finds that the designers did not evaluate the likelihood that, under prevailing meteorological conditions, high surface water run-off from upstream areas would coincide with high water levels in the Arabian Sea**
152. **Risk Assessment.** The importance of keeping the northern embankment intact for the protection of the dhands was recognized and early warnings about the fragility of the embankment abounded.¹¹² **The Panel finds that the Tidal Link structures were critical to the performance of the system but the design had substantial inherent risks. The Panel finds that the LBOD designers underestimated the risk of extreme meteorological events.** The Panel's expert observed that the design of the embankments was based on insufficient geotechnical data. As described above, they built from excavated material not suitable for the task. There were no berm protections or bed armoring, whereas under prevailing conditions a structure similar to a sea dike would have been required but would have been much more expensive.
153. The Panel's expert found that there were no provisions for an emergency closure of the Tidal Link. No facilities were in place to warn the population and mitigate flood impact. There were no fail - safe provisions in the design. **The Panel considers that the design and construction went ahead without adequate provisions to minimize the risk that the structures would give way and to mitigate possible harms.**

4. Performance of LBOD

a. Development Objectives

154. Management contends that overall the Project has reached its development objectives—namely lowering the water table in three districts, reducing soil salinity and increasing agricultural production.¹¹³ The Panel reviewed salinity and water table monitoring data of MOS and agricultural census data of the Sindh Department of Agricultural Extension.
155. The data confirm the claim that the water table is on average considerably lower than before the Project and that the agricultural production has substantially increased. It is

¹¹¹ National Institute of Oceanography, "Disposal of Saline Drain Water to the Arabian Sea through Tidal Link Drain LBOD", Power Point Presentation, Karachi, 2005.

¹¹² Panel Interviews with local people.

¹¹³ Implementation Completion Report (ICR), Pakistan Left Bank Outfall Drain Stage-1 Project (Credit No. 1532-PAK) June 19, 1998, pp. 2-8 (Achievement of Objectives).

however not clear whether the lowering of the water table is due to the Project or to decreased water supply in the past four years, resulting from drought and increases in agricultural intensification and production. It is difficult to separate the effects of the many intervening factors. The Panel received information that only about 60% of the tubewells constructed under the LBOD project are still in operational condition. The Project Completion Report and the Management Response are silent about the agricultural and socio-economic conditions in the lower Badin area. Management has, however, recently carried out a socio-economic survey of the area.¹¹⁴

156. The Panel concludes that at the time of appraisal the development objectives were plausible. The selection of the routing of the outfall drain could be justified; however, alternatives should have been evaluated in proper depth. The inherent risk of the selected option has not been properly evaluated and little had been done to minimize the risk through appropriate design and water management procedures. **The underestimation of risk and the lack of appropriate technical measures have contributed to suffering of people in lower Badin.**

b. Performance of Structures, including Cholri Weir

157. Changes of natural systems like the LBOD are usually gradual processes. It requires time to build up sufficient pressure to bring about visible changes. However, sudden changes occur under the influence of extreme events when the existing equilibrium becomes disturbed. Since completion in 1995, the LBOD outfall system has suffered from two severe meteorological events that caused substantial damage to the structures and brought about profound and sudden changes to the ecosystem. Most of the effects to the ecosystem described below can be attributed to the two extreme events. From the beginning, the design of the LBOD outfall system was not in harmony with the winds and the natural flow of water. Even while the structures were still holding, gradual changes to the ecosystem occurred.
158. As described in more detail in Chapter 4, **the LBOD system, combined with the partial destruction of the Tidal Link, has heightened the risks to local people from storm-water as well as from flooding.** Floodwater from high intensity rainstorms is carried much more rapidly from the northern districts down to the low-lying areas of Badin. At the same time the tidal link has developed into an active tidal creek that exposes the dhands and adjoining agricultural land to the risk of sea water inundation at spring tides. The feed-in drains to the LBOD in lower Badin have no provisions for closure and flow backwards during high tides leading to the salinization of agricultural land and trapping villages and people. **The situation is particularly bad when heavy rainfall inland and high tides and storm at sea coincide. The 2003 floods led to the loss of many lives** (see Chapter 4).
159. **Performance of the Cholri Weir.** One of the principal objectives of constructing the Cholri Weir was to stabilize the water level and to preserve the environment of the dhands while permitting some inflow at high tide in order to attenuate peak water level. The level of the weir was chosen to limit water levels to their seasonal maximum in the

¹¹⁴ World Bank, Diagnostic Study and Proposal for Livelihood Improvements: Badin and Thatta Districts, Sindh, Pakistan, April 2005, [hereinafter "Diagnostic Study"]. This study is also referred to as Socioeconomic Study and Proposal for Livelihood Improvements: Badin and Thatta Districts, Sindh.

dhands. It was designed for flow in either direction according to the tidal cycle with the crest level of 4.5 ft.

160. From the beginning the functioning of the weir caused concern. Specialists were called in by LBOD Consultants to investigate the weir and the erosion of the embankment. Measurements on September 16, 1996, revealed a very substantial flow over Cholri Weir of 3.2 million m³ per day.¹¹⁵ The consultants explained this as a normal phenomenon at the end of the monsoon season. It is of importance that the Cholri Weir was built in a direction parallel to the Tidal Link. As a result, it was subject to water flows from the dhands in one direction and from strong tidal currents in the drain going in a perpendicular direction. There was no protection of the Tidal Link channel bed at the base of the weir. Therefore, soil particles in the channel bed stirred up by the flow of water over the weir would be carried away by the tidal current. The erosion would thus be a continuing process because a sediment-saturated vortex could not develop in front of the weir. The specialists recommended a monitoring program of this dynamic but for unknown reasons this was not implemented.
161. During the night of June 24, 1998, a large section of the weir collapsed. A deep scouring hole had developed in front of the weir and the sheet piles had given way. Many attempts were made to close the breached weir section, but all failed due to monsoon weather and the remoteness of the site. By the end of October 1998 the federal and provincial authorities and the consultants who visited the breach site jointly decided to stop further remedial works since the breach in the weir had increased to 450 feet in length from the southern end.



Picture 3: Tidal Link -- Channel on Left Side and Dhand on Right Side -- (at RD -35)

¹¹⁵ LBOD Consultants, Morphology of the Tidal Link, Post 1996 Monsoon, May 1997, p. 9.

162. The Government of Sindh Province established a Panel of Experts (PoE) to investigate the causes of the failure. The PoE concluded that the insufficient embedded length of the sheet piling and the missing channel bed protection were the most critical factors for the failure. The consultants had calculated the length of the sheet piles for soil characteristics and water pressure but had not taken the risk of erosion into account. In addition, soil characteristics were not sufficiently investigated. There were conflicting accounts as to why the embedded length of the sheet pile was reduced from 17 to 11 feet. The LBOD consultants did not accept liability for the design. Since no agreement was reached WAPDA decided not to use the consultants in any future work.
163. On May 21, 1999 a tropical cyclone hit the Tidal Link area and the Cholri Weir was nearly totally destroyed. Since then the breach has developed into a tidal creek and saline sea water enters freely the Pateji and Cholri dhands. Both dhands empty when the water flow is reversed during low tide.
164. **Performance of the Embankments.** Erosion along the embankments was first observed in discrete areas on the berms and the channel of the Tidal Link before the channel was commissioned in June 1995.¹¹⁶ When the channel was fully opened in June 1995, tidal flow in the channel exacerbated the erosion and it was decided that specialist guidance was needed to assess the causes and develop suitable solutions.
165. The first attempts of remedial works concentrated on restoring the eroded embankment reaches to their original profile using selected cohesive material. It quickly became apparent that this was insufficient and rock armoring was applied to the face of the restored embankments. However, in most locations, the depth of the scour pocket was too deep to allow effective construction of a suitable rock toe to the embankment armor and these were soon undermined. In one location (RD -104 to -106) where the depth of the scour pocket was not significantly different than with the original channel bed level, the armoring has been successful, the erosion of the embankment has been contained and a small beach has been re-established at the toe of the embankment.
166. The World Bank became increasingly concerned about the erosion problem and the risk of a failure of the embankments. It first requested a monitoring program with monthly reports¹¹⁷ and a comprehensive report by the end of the year. The following Review Mission in November 1996 requested that an independent panel be established to investigate the cause and possible remedies of the problem.¹¹⁸ No action was taken on the matter until May 1998 when a Bank dam specialist visited the project and urged immediate action as the situation was deteriorating.¹¹⁹
167. On 21 May 1999, tropical Cyclone 2A hit the tidal areas of Thatta and Badin Districts. **As a result, seawater over-ran the Tidal Link. The structure suffered badly and 54 breaches in the embankments occurred at different locations, bringing devastation and loss of life to the adjacent communities.** Both embankments were destroyed. The

¹¹⁶ LBOD Consultants, Morphology of the Tidal Link, Post 1996 Monsoon, May 1997, p. 6.

¹¹⁷ LBOD Stage I Project, Joint Donor Review Mission, March 2 -19, 1996, Aide Memoire, para 4.2.

¹¹⁸ Joint Donor Review Mission, Aide Memoire November 1996.

¹¹⁹ Chotiari Reservoir (LBOD) and Tidal Link as part of NDP Project, Technical and Project Implementation Review, Aide-Memoire, May 5, 1998.

channel however, continued functioning as a natural stream and outfall for the drainage water of the three districts Nawabshah, Sanghar and Mirpurkhas.

168. **Performance as Drainage Outfall.** Up to June 1998 when a large portion of the weir collapsed, the Tidal Link was performing reasonably well in its function as a drain. Tidal influence and sea water intrusion were close to predictions. A net outflow of about 2.5 million m³ per day had been measured. This was accompanied by a sharp reduction of salinity in the dhands and the cut-off of surface water flow to the Rann of Kutch.
169. Since the collapse of weir and the cyclone breaches in the embankment, the water and salinity balance of the Tidal Link and the dhands has changed. The Tidal Link flow is no longer confined, and is now intermingled with the flow to and from the dhands and the Rann of Kutch at every tide cycle through the breaches along the embankments. The salinity has been increased in the Tidal Link up to RD 0 and beyond. This has become especially pronounced in the last years because of the severe drought that has significantly decreased drainage flow from KPOD.¹²⁰

5. Effects on People and the Environment

170. The effects of the LBOD system on people and the environment in lower Sindh have been severe. These effects are linked to changes in water balance, water flows and salinity,¹²¹ as well as higher levels of chemical contamination in waters flowing into the region. As described below, the results include major harms to the ecosystem and fisheries of the dhands, damage to agricultural land and loss of grazing lands, contamination of groundwater, and increased risk and intensity of floods. The system also has altered the overall morphology of the region, and is leading to a notable equilibrium shift.

- **Ecosystem of the Dhands**

171. As mentioned above, the failure of the Cholri Weir and the embankments altered profoundly the previous stream flows and salinity pattern of the dhands. Table 2 shows how salinity in the dhands declined after the construction of the embankments (which isolated the dhands from the Rann of Kutch). After the failure of the Tidal Link, salinity increased sharply reaching levels higher than sea-water salinity in some places due to the evaporation effect. This is demonstrated by the salinity measurements of 2004.

¹²⁰ Continuing monitoring of cross- and longitudinal sections since 1999 by NIO revealed that the erosion is still progressing all along the Tidal Link and in KPOD, particularly near the discharge of the Tidal Link Canal into Shah Samando Creek. The most severe changes in the longitudinal profile of the channel are observed in the breached zone, downstream from RD- 38. Maximum velocities in the Tidal Link at the time of NIO measurement were around 1.2 m/s. This velocity is greater than the permissible velocity of the material forming the channel, which should be less than 0.8 m/s for silt loam. Therefore, the channel cross sections and longitudinal profile are continuously changing, due both to erosion produced by the above mentioned high velocities and the relatively high load of sediments brought from upstream sections.

¹²¹ Available data suggest that the tidal influence now extends considerably upstream in the Tidal Link and into KPOD. The National Institute of Oceanography (NIO), established in Karachi in 1981, reports that the tidal amplitude at RD -93 is about 2 m and at RD -21 it is still 1.50 m according to measurements taken in Nov. 2004. NIO further reports that the influence of tidal fluctuation is noticeable up to RD +2, within KPOD and near the outfall of Serani drain into KPOD.

Table 2: Salinity Measurements in the Tidal Link Area (dS/m)¹²²

Location	1987-1988	January-February 1997	2004
Mehro Dhand	4.3-12	1.5-8.7	50
Sanhro Dhand	4-15	1.7-11.8	50
Cholri Dhand	15-77	7.7-20	54
Pateji Dhand	15-80	18-38	97
Tidal Link channel	NA	10-25	54
Rann of Kutch	5.5-80	15-170	NA
Shah-Samando Creek	54	NA	54
Open Sea	54	54	54

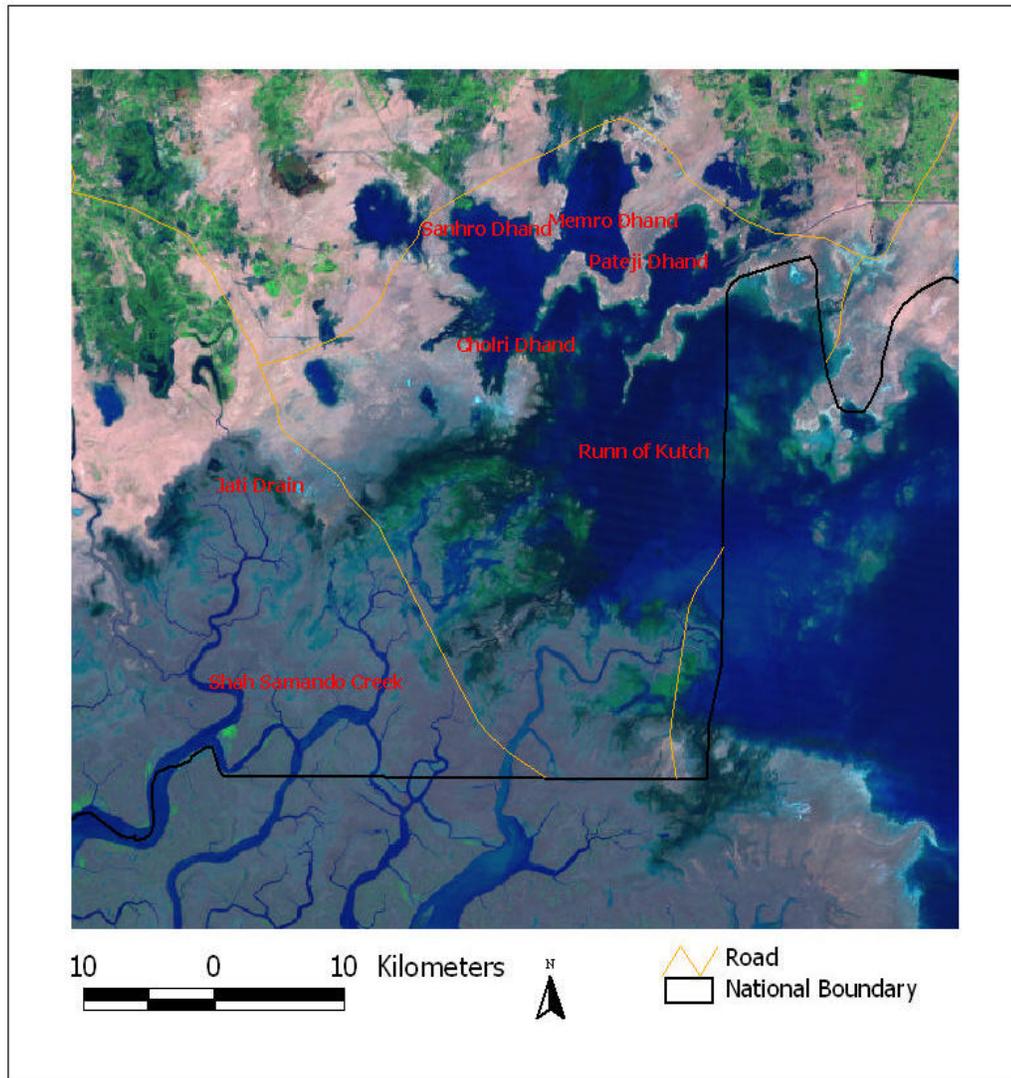
Sources:

- Column 1: Delft Hydraulics: Left Bank Outfall Drain Stage 1 Project. Pre-Design Study for Tidal Link and Outfall. Volume 1, Report on Survey Activities. March 1988
- Column 2: LBOD Consultants: Morphology of the Tidal Link, May 1997
- Column 3: National Institute of Oceanography: Annual Physical Monitoring Report. Karachi 2004.

172. The data in Table 2 demonstrate the decline of salinity from 1989 to 1997 and a sharp increase throughout the dhands since 1998. Up to 1997 at least, salinity conditions remained very favorable for the basically brackish or estuarine ecosystem that had developed over the years in the dhands. At present, salinity conditions range from those typical for sea water to the hyper-salinity of the Pateji Dhand.
173. Changes in the dhands also are visible through remote sensing images. Figures 4, 5 and 6, below, show the dhands at three points in time: in October 1989, prior to construction of the Tidal Link (Figure 4); in October 1998, after construction of the Tidal Link (Figure 5); and in November 2003, after the severe damage to and breakdown of the Tidal Link (Figure 6).
174. Figure 4 shows an overview of the area in October 1989 prior to Tidal Link construction. It shows that the entire dhand system as well as the Rann of Kutch are all connected and form one large wetland/lake ecosystem. In the North East corner the endpoint of the LBOD is visible.

¹²² Measurements of electrical conductivity have been converted to dS/m (deci Siemens per meter) using the conversion rates of 1 dS/m equals to 640ppm (part per million) of dissolved solids.

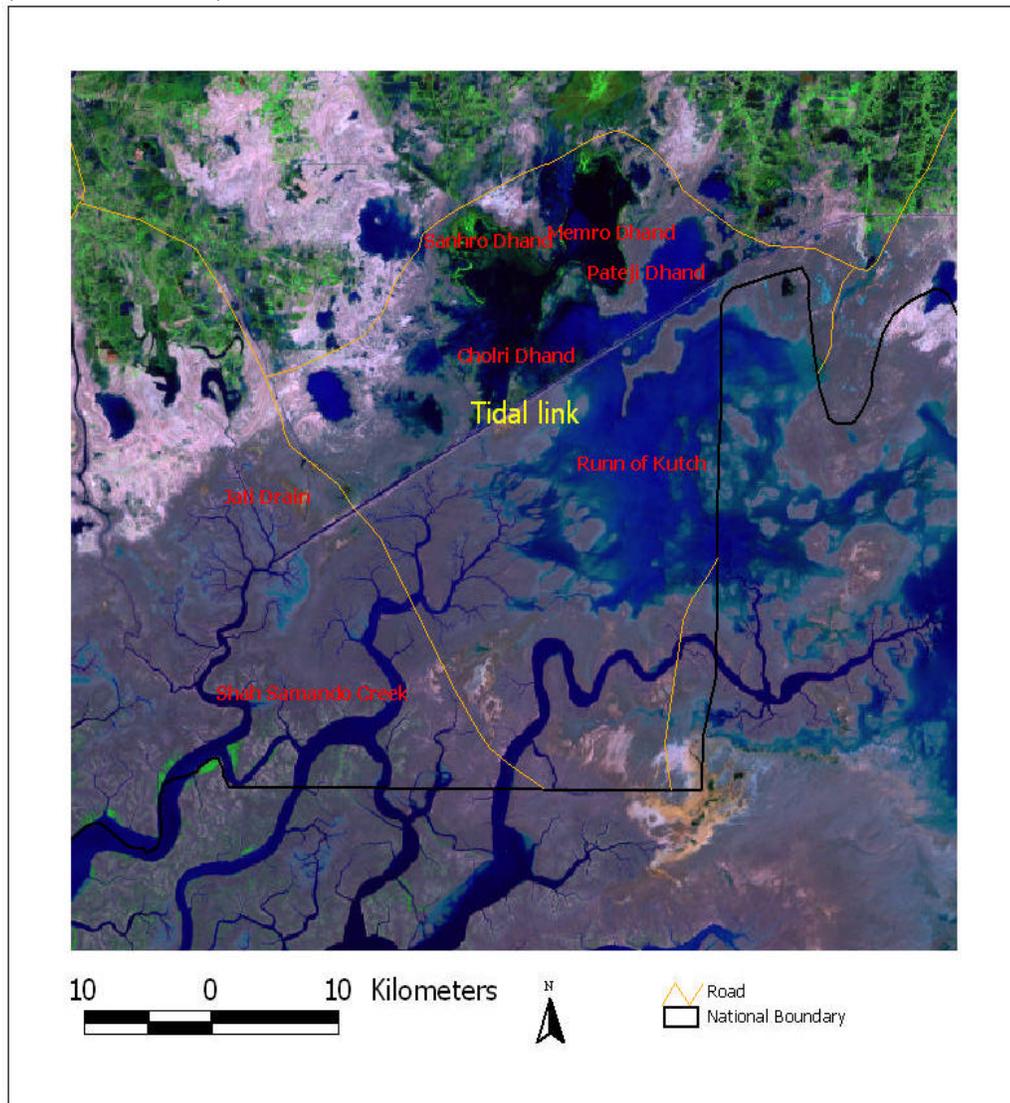
Figure 4: Overview Remote Sensing Image before Construction of the Tidal Link (October 21, 1989)



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; black line is border between Pakistan and India; yellow lines are roads)

175. Figure 5, below, shows the situation in October 1998 during low tide, where the white areas indicate mud plains. This is the moment just after the Cholri Weir has collapsed but before major damage was done to structure by the May 1999 cyclone. The figure shows that the Dhand and the Rann of Kutch water systems are now separated by the embankments of the Tidal Link.

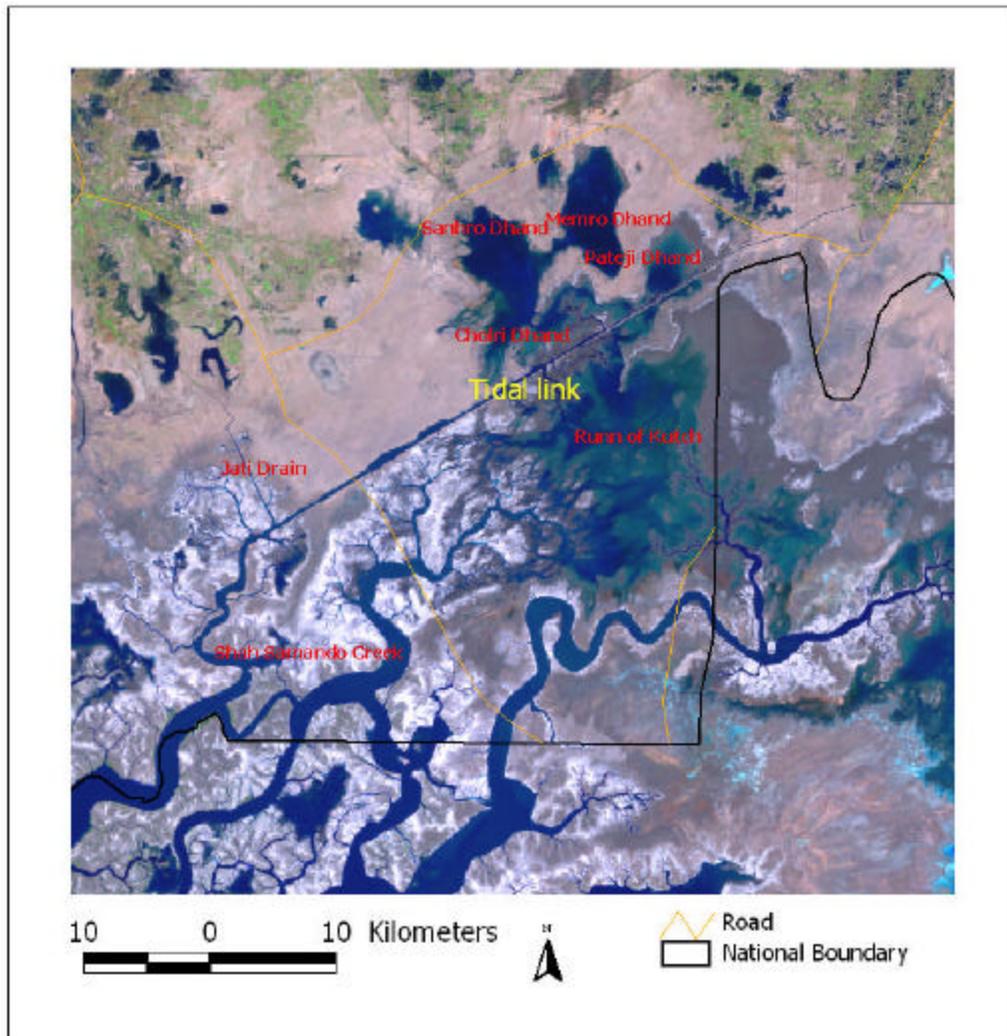
Figure 5: Overview Remote Sensing Image after Construction of the Tidal Link (October 30, 1998)



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link; black line is border between Pakistan and India; yellow lines are roads)

176. Figure 6, below, gives an overview of the area in October 2003. The image provides the evidence of the enormous changes that have occurred in the system. The May 1999 cyclone and the flooding in 2003 have done severe damage, and it is clearly visible that the structure has been breached in many places. A whole new morphological system has developed of active tidal creeks and mud plains (white color) caused by sedimentation at the interface of salt and fresh water.

Figure 6: Overview Remote Sensing Image after Severe Damage to the Tidal Link (November 11, 2003)



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link; black line is border between Pakistan and India; yellow lines are roads)

177. The high salinity has led to profound changes on the ecosystem of the dhands. Salinity in Pateji Dhand, formerly the outfall of KPOD, is extremely high, around 68000ppm. This is due to high evaporation in the area and the fact that this dhand no longer receives water from any drain while the other dhands do. The water of the Pateji Dhand is practically biologically dead.
178. The effects are evident: a major decrease in birds and waterfowl, absence of the distinctive vegetation and other fauna that existed in the shallower areas of the dhands, and a major decrease in fishery yields. The hyper-salinity of the Rann of Kutch is remarkable, indicating that surface flow was intercepted during the early existence of the Tidal Link and the embankments and that after the collapse of the embankments saline water of the Tidal Link and the dhands flowed through the existing breaches and evaporated in the depressions. The effects on the dhands and the

associated ecosystem are considered in more detail in Chapter 3 (Environment) in the light of the relevant policies and procedures of the Bank.

179. The loss of fish and fish species in the dhands has had dramatic consequences for the once-many fishermen in the region and for the local communities where they live. The impacts on people and communities are considered in more detail in Chapter 4 (Social) in the light of relevant policies and procedures of the Bank.

- **Agricultural and Grazing Lands**

180. Remote sensing data (see figures above and in Annex) and testimony of local people show that prior to the construction of the Tidal Link the size of the dhands and therefore the agricultural land fluctuated considerably. Kotri drains were discharging into the dhands during monsoon season. Depending on rainfall and excess irrigation water the dhands filled to different levels.
181. The situation changed somewhat when the Tidal Link was built. The water level in the dhands was stabilized through the embankments and the Cholri Weir. While most of the Kotri drains continued flowing into the dhands, the KPOD and the Serani drain were diverted into the Tidal Link. These measures caused an increase in the water level of the dhands and consequently some flooding of land mainly to the west. On the other hand the water in the dhand became increasingly sweet which increased the biological productivity and caused benefits for adjacent agricultural land.
182. The situation changed dramatically when the weir collapsed and the embankments breached. The dhands became part of the tidal system with daily water level fluctuations and much more saline water. While the water levels in the dhands became lower on average, the risk of flooding increased. The flooding of 1999 caused long-term damage because of the high salt content of the water and the salt deposited on the land.
183. Another problem has been observed with low lying drains linked to the LBOD such as the Serani drain. The outlets of these drains are now under the influence of tidal movement. At high tide, water flows back into these drains causing salinization of groundwater and of adjoining land. An obvious solution would be to consider the provision of flap gates that close at high water and prevent the inflow of saline water. This time-tested technology is standard in tidal regions throughout the world but it was not yet employed during the Panel's visit.
184. Land to the south-east of the Tidal Link has been traditionally used for grazing although the soil is highly saline. In good rainfall years, however, surface run-off flowed in a south-easterly direction. This diluted the salt so that a good grass cover could develop for several months, which was important in maintaining the livestock of local people. The Panel notes that the environmental impact assessment of 1989 had overlooked this specific function.
185. **The construction of the Tidal Link and the embankments had cut-off and diverted the surface flow and consequently destroyed the grazing areas. The**

Panel was informed that originally there were seven villages in the area but five had to be abandoned leaving only two with a shrinking population¹²³

- **Groundwater**

186. People complained to the Panel that the groundwater in the area had become more saline. Available data suggest that the groundwater always has been saline because the land was formed from marine deposits during rather recent geological periods. However, as canal irrigation evolved, lenses of fresh water developed. This water was an important source of drinking water supply which was extracted by hand pumps. The Panel saw several hand pumps in operation that were installed besides irrigation canals. People confirmed that these pumps were still yielding water of acceptable quality. There was even a hand pump at RD 0 of the KPOD. However saline water now reaches this point at high tides and sometimes flows back into low lying drains. If no measures are taken, such as the installation of flood gates, it is likely that the water will become unfit for drinking in near future in these areas.

- **Flooding of Settlements**

187. The cyclone of 1999 and the flood of 2003 had profound effects on the livelihood of the affected population. People in the area are traumatized by the repeated flood events and relate it to the outfall system. The Panel heard vivid accounts of the human suffering and the devastation caused by the flood. A major concern is that these floods could happen again at any time. People feel vulnerable and abandoned because so little has been done in the past years to mitigate the damage and to provide better protection.

188. **It is the Panel's opinion that the construction of the LBOD and the Tidal link has increased the risk of flooding in the lower Badin area.** Cyclones happen but are relatively rare events in the region. Records show that in the past 100 years four cyclones have hit the Indus Delta. Advance warning systems, flood shelters, and construction of houses on elevated ground would help to reduce human losses but flooding of the very low lying area cannot be avoided because of the build-up of the sea water level along the coast during a cyclone. The mud flats and the sand bars of the Rann of Kutch provided some protection in the past for the dhands and the villages. Now as the dhands are linked to the tidal system and the creeks have widened and deepened, people feel that the sea is much closer and the flood risk more acute.

189. The risk of surface water flooding has also increased. The flood of 2003 was caused by high intensity rainfall over wide areas of lower Sindh, accompanied by strong south-west winds and high tides. This produced two adverse effects. The drainage system provided a convenient route for the surface water to rush to the south. This effect was increased by mismanagement of the system; farmers breached the bunds to accelerate run-off from their fields, canals were not closed and unwanted water diverted into the drains, tubewell pumps were kept running.

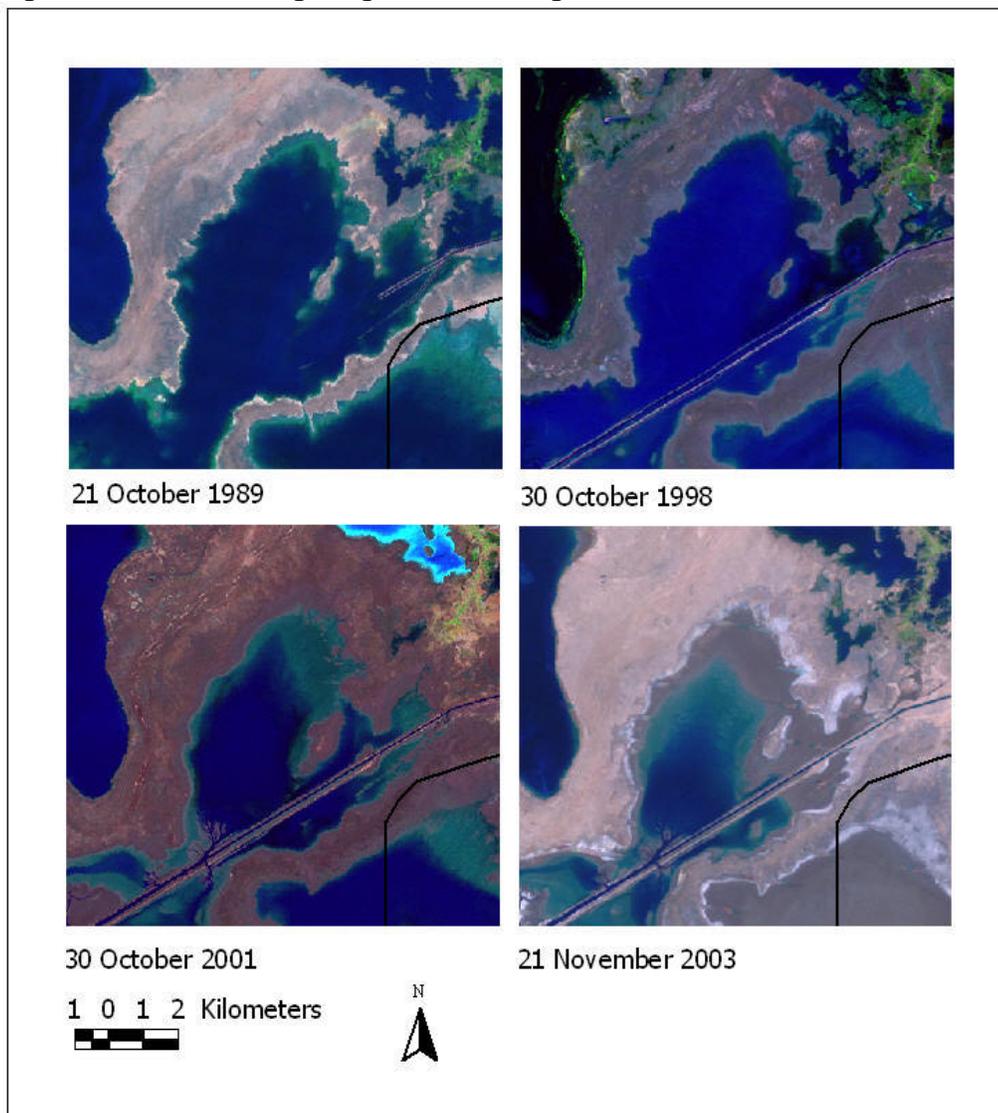
¹²³ Panel interviews with local people.

190. This increased the load on the spinal drain much beyond design capacity. The maximum flow at the KPOD/DPOD bifurcation was recorded at 10000cfs and perhaps 15000cfs as against a design capacity of 6000cfs. The enormous volume of water met high sea water level in the tidal link and the dhands and flooded the lower Badin area to a depth of up to 15 feet. People report that in contrast to earlier floods, such as that of 1964, this time the flood water of 2003 was very saline and stayed in the area for several days. In addition, the structure of the LBOD and Tidal Link Canal passing through southern Badin in a south-westerly direction, with its high embankments, blocks floodwaters from their usual north to south flow into the Rann of Kutch and the ocean.
191. The cyclone of 1999 led to the loss of many lives and widespread suffering and damage. The impacts of this storm and the floods of 2003 are described in more detail in Chapter 4 (Social).

- **Morphology of the Region**

192. The National Institute of Oceanography (NIO), under contract of the Salinity Control and Reclamation Project (SCARP) Monitoring Organization (SMO), carries out monitoring in the outfall area covering meteorological, oceanographic, and hydraulic parameters. The results of the monitoring campaign are reproduced in the annual reports of SMO.
193. It appears from this monitoring that the LBOD and Tidal Link are quickly becoming both a new river and an upstream extension of the Shah Samando Creek. Satellite images (see Figure 7 below) show that several tidal fingers have developed around the channel from breaches left by past floods and cyclone events. It is expected that this situation will continue to develop until a new equilibrium is achieved in which sediment load carried by the tidal wave and upstream flow is compensated by sediment detachment brought about by the ebb phase of tide. Existing tidal fingers have also extended further in the northern direction and in some cases have joined those connected to the Tidal Link. Satellite images also show a reduction of the surface area of the dhands, although it is not clear whether this effect has been due to changes in the Tidal Link or to drought conditions.

Figure 7: Remote Sensing Images of Tidal Fingers from Breaches in Tidal Link



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link; black line is border between Pakistan and India; yellow lines are roads)

194. **At present there are some signs that the situation is gradually stabilizing. Nevertheless, NIO data show a continuation of the bed erosion in the Tidal Link. The Panel observes that interpretation of the larger picture of the enormous amount of data available is still lacking.**

D. NDP Project Components and Implementation

1. Main Project Components

195. As indicated in Chapter 1, the NDP Project was divided into four main components. The component on sector planning and research provided funds for capacity building and technical assistance to carry out policy-oriented studies. These included sector

planning studies and feasibility studies to prepare a pipeline of high priority projects for the sector. It was agreed that WAPDA, in consultation with the Bank, would carry out the pre-feasibility study for the National Surface Drainage System (NSDS).¹²⁴ If the pre-feasibility study confirmed the NSDS's viability, WADPA would carry out the full feasibility study (including an Environmental Assessment and Resettlement Plan), financing plan, and legal framework for its operation.

196. The institutional reform component sought, among other things, to reform water sector institutions. Elements included: (a) redefining roles and functions; (b) decentralizing roles and responsibilities; (c) streamlining; (d) transferring management responsibility from PID to PIDAs, AWBs, and FOs, or to the private sector; and (e) capacity building for WAPDA and the new public and private institutions.
197. With respect to program coordination and monitoring, a Federal Project Steering Committee (FPSC) was established with overall responsibility for this activity. The FPSC would be chaired by the Secretary of the MW&P of the Borrower. Members of the FPSC include the Federal Secretaries for Finance, Planning and Development, Economic Affairs; Additional Chief Secretaries (ACS)-Development of Provinces; and the Chairman of WAPDA.
198. The investment component of the NDP Project had the objective to promote long-term sustainability of Pakistan's irrigation and drainage infrastructure. To help achieve this objective, implementation of investments was linked at the outset to institutional reforms.¹²⁵ The SAR also specifies that investments would be carried out by implementing agencies eligible for funding under the Project, and notes relevant eligibility criteria for annual incremental funding commitments to these agencies.¹²⁶
199. The investment components were defined in general terms. According to the SAR, the Borrower would maintain policies and procedures adequate to enable it to monitor and evaluate, on an on-going basis, the carrying out of the Project and achievement of its objectives.¹²⁷ Proposed investments included provisions to complete remaining work of the Left Bank Outfall Drain (LBOD) (estimated cost: US\$166 million) and Operation and Maintenance of recently completed projects (notably LBOD – estimated cost US\$46 million).¹²⁸
200. The broad categories of investment envisaged under the NDP included: (i) rehabilitation, improvement, and construction of off-farm drainage; (ii) rehabilitation, improvement, and construction of on-farm drainage; (iii) rehabilitation and modernization of irrigation systems; and (iv) operation and maintenance through

¹²⁴ The NSDS refers to the proposed extension northward of the LBOD, which also is referred to as the “*drainage superhighway*.” This proposal, and its status, is discussed in more detail below.

¹²⁵ SAR (NDP), ¶ 2.7 (stating that “*if the pace of reforms is slow due to lack of government commitment, implementation constraints, or resistance/lack of commitment by WAPDA, PIDAs or AWBs for real change, the Borrower and IDA have agreed and understand that the incremental financing commitments for irrigation and drainage investments under NDP; would be scaled back or cancelled altogether after the [Mid Term Review] or 2-3 years.*” See also ¶ 2.26.

¹²⁶ SAR (NDP), Annex 1, ¶ 2(s) and ¶ 2.26.

¹²⁷ SAR (NDP), ¶ 5.23.

¹²⁸ SAR (NDP), ¶ 2.35.

performance-based contracts awarded to the private sector. Investments to be financed by the NDP Project were expected generally to be subprojects costing each less than US\$30 million equivalent.

201. However, some larger operations were also envisaged, including: (i) the completion of LBOD (noted above) and Right Bank Outfall Drain (RBOD) in Sindh, and (ii) new projects such as the Dera Ghazi Khan Integrated Irrigation and Drainage Project in Punjab, the Kafur Dheri Surface Drainage Project in NWFP, and the Lasbela Drainage Project in Balochistan. Remaining works of LBOD included the following items: Rehabilitation and remodeling of LBOD spinal drain, Remedial work on Tidal Link, Installation of electrical lines in Sanghar and Mirpurkhas, Chotiari Reservoir,¹²⁹ Remodeling of Nara Canal, Work on Jamrao Canal, Tile drains in Mirpurkhas, and construction and rehabilitation of drainage infrastructure.¹³⁰ The portion of these investment works financed by IDA was estimated at US\$118.9 million.¹³¹
202. For the longer term, the initial strategy of the NDP Project was to “*use environmentally sustainable methods for disposal of saline drainage effluent (...) and lay the groundwork for construction of a permanent trunk drainage network connected to the sea via LBOD’s Spinal Drain which would be known as the NSDS.*”¹³² The SAR highlights its support for the NSDS, indicating that “[s]ustainability can only be achieved in the long run by building an NSDS.”¹³³ Actual investment into the trunk drains was kept pending awaiting the results of the institutional reforms and the completion of the feasibility study for the NSDS. Issues of investment under the NDP Project, and the fate of the NSDS, are reviewed in more detail in later sections in this Report.

2. Evolution of NDP Project during Implementation

203. The NDP Project as designed during appraisal was quite different from the Project that closed in December 2004. A host of political institutional and operational problems led to a very slow implementation pace and raised serious doubts about the ownership of the Project's basic strategy and program for reform and investment. The principle cause was the presence of strong forces that were hostile to institutional reforms. Since the Bank had linked the investment component to the progress of institutional reforms that project came to a practical stand still in the year 2000.
204. Restructuring and renewed political commitment during Mid-Term Review solved the problems only partially and forced the Bank to scale-down the project and divert substantial unused funds to the drought relief program. Only Sindh made significant progress on the reforms in the final phase. At the end the institutional reforms remained fragmented. Doubt exists about the sustainability of the newly created

¹²⁹ As noted above, while the Bank did not fund this component of the Project after the Borrower’s rejection of the FLAR, funding was provided by the Saudi government as part of the overall NDP Project, and the Bank continued to have an obligation to supervise the resettlement component. See also Chapters 3 and 4 of this Report.

¹³⁰ SAR (NDP), Annex 4, ¶ 5.

¹³¹ SAR (NDP), Annex 4, ¶ 5.

¹³² SAR (NDP), ¶ 2.5.

¹³³ SAR (NDP), ¶ 1.24. The NSDS as shown in the SAR is indicated by a dotted line in the Map attached to this Report.

Provincial Irrigation and Drainage Authority (PIDA), Area Water Boards (AWBs) and Farmer Organizations (FOs).

205. With respect to investment, Management reported at Mid-Term Review that substantial work had been undertaken to complete the LBOD remaining works, and noted that several O&M contracts had been awarded for various components of the LBOD.¹³⁴ At the same time, a number of changes were introduced in response to various factors and to recommendations of a Panel of Experts financed through Bank funds. Among other things, significant funding was shifted to drought problems (US\$100 million or perhaps even more),¹³⁵ and the originally envisioned investment component was scaled back. In this regard, Management stated in its Response that the “NDP will not extend the LBOD Spinal Drain further north.”¹³⁶
206. Recent Project documents suggest, nevertheless, a substantial level of physical investment under the NDP Project, though reduced from levels originally planned. The progress in meeting targets for “*Rehabilitation/Extension of Existing Surface Drains*,” for example, is indicated as 785 kilometers in Sindh and 994 kilometers in Punjab.¹³⁷
207. The Panel also notes that Project documents often use general terms in describing investment proposals and actions, including phrases such as “Rehabilitation/Extension” or “Completion” of the LBOD. This makes it difficult to assess precisely what has and has not been done under the Project, let alone to examine the related impacts. This ambiguity is magnified by the often large associated budget figures and broad geographic scope of coverage.
208. The Project also supported development of the Drainage Master Plan (DMP), setting forth drainage and other supporting non-drainage measures to address the continuing problems of waterlogging and salinity in the Indus Basin.¹³⁸ Work on this DMP started in 2002 in parallel to the NSDS pre-feasibility study. The draft DMP was completed in August 2004, and the final version was completed under the NDP Project in December 2005. While national in scope, the DMP proposes regionalized solutions through creation of drainage districts to make regions and sub-regions responsible for drainage management.

¹³⁴ Mid-Term Review Report, March 20 – April 7, 2001, p. 4, Annex 5, 6 and 7.

¹³⁵ Management Response (¶ 20) indicates that US \$100 million was shifted to drought efforts. The Final Implementation Review Mission (December 17-22, 2004) – Aide Memoire, February 10, 2005 (¶ 3.3), however, indicates that an amount of US \$137 million was made available for drought efforts from the NDP and of this amount, US \$ 127 million was utilized up to the Credit closing date.

¹³⁶ Management Response, ¶ 6.

¹³⁷ Final Implementation Review Mission, February 2005, Aide Memoire, pp. 19-20. Other data are provided for rehabilitation of canal systems, water course improvements, and financial values of the relevant contracts. The Mission Report listed actual expenditure cost of investments in Sindh Province on “*New schemes, Off farm drainage, On farm drainage and Modernization of Canals*” as Rs. 2722.91 million. See Aide Memoire, p. 5 and Annex D. Some of the works are listed as ongoing and/or partially completed (tubewells; rehabilitation of drainage systems). See Aide Memoire, pp. 18-19. The NDP Project also took actions relating to the Chotiari project (see Chapter 3). As noted elsewhere in this Report, the Bank did not fund this component after a disagreement over the FLAR, but retained a supervision responsibility.

¹³⁸ DMP, Foreword and Executive Summary, p. 2 and 16.

209. The August 2004 draft DMP proposed a major infrastructure development known as the Trans Basin Outfall Drain (“TBOD”),¹³⁹ which a Panel of Experts referred to as a “renamed” version of the NSDS.¹⁴⁰ The proposed TBOD would start in Chaj drainage basin from Mona Drain, and would either “*join the extended part of LBOD Stage-II*” or it would be “*constructed through Nara and Thar desert avoiding interference with Nara and proposed Raineer and Thar canal systems (...) [to] join the LBOD system at RD-86 of KPOD.*”¹⁴¹
210. As noted in Chapter 1, however, the Panel found little mention in the final version of the DMP of a northward extension of the LBOD along the lines of the TBOD or the NSDS. The Panel understands this to mean that such proposals are no longer being planned. Nevertheless, an annex for the preliminary Environmental Assessment mentions “*construction of TBOD*”¹⁴² and Chapter 2 mentions that with the construction of the Right Bank Outfall Drain (RBOD), “*the environmental situation for LBOD becomes more promising for accommodating the NSDS as proposed by Indus and Louis Berger, 2002 NDP Policy Studies.*”¹⁴³ The Panel considers that clarification on this topic is of particular importance, given the great degree of concern expressed by Requesters with an LBOD expansion along the lines of an NSDS or TBOD.
211. The final DMP also notes plans for increasing the flow of effluent into the LBOD from sources within Sindh Province. For example, several projects increase the drainage from the Sukkur Left Bank Drainage Basin, the saline effluent of which is discharged into the LBOD.¹⁴⁴ Millions of acres in the basin are to be drained in this basin.¹⁴⁵ Likewise, the Guddu Left Bank Drainage Basin, including the Raineer Canal Surface Drainage Scheme which is explicitly linked to the LBOD¹⁴⁶, will increase drainage area by millions of acres.¹⁴⁷ The potential implications of these proposals for the Requesters and southern Sindh are considered in Chapters 3 and 4 of this Report.
212. During implementation, Management also reviewed issues raised by the deteriorating situation of the LBOD resulting from the collapse of the LBOD Tidal Link. As described in detail in Chapter 5 (Supervision), the Bank fielded a Mission to the area in 2001. Based on its review, the Bank Mission agreed with the conclusions and recommendation of the Government of Sindh Technical Committee that no repair should be carried out to the Tidal Link and the Cholri Weir as damage done by the cyclone was beyond the repair limit, and the Tidal Link continued to function well as a drain. The Mission considered it justified not to attempt to repair the weir because

¹³⁹ Draft DMP, August 2004, Section 4.7.11.3, p. 4-21.

¹⁴⁰ DMP Panel consultation December 2004, Key Information, p. iv.

¹⁴¹ Draft DMP, August 2004, Section 4.7.11.3, p. 4-21 and 4-22.

¹⁴² DMP, Annexure VII-2 (Checklist for Preliminary Environmental Assessment), p. 83.

¹⁴³ DMP, Chapter 2 (Development and Adequacy of Drainage System), p. 24. In an e-mail to the Panel, Management said that this reference “indicates the reference to the IPEO comments about NSDS” (E-mail from Management to Inspection Panel, dated March 9, 2006).

¹⁴⁴ DMP, Chapter 6 (Identification of Projects for Implementation), p. 171.

¹⁴⁵ DMP, Chapter 6, Annexure VI-1 (Proposed Drainage Area and Identified Drainage Works in the Indus Basin), p. 63.

¹⁴⁶ DMP, Chapter 6, p. 170.

¹⁴⁷ DMP, Chapter 6, Annexure VI-1, p. 62.

the damage was beyond repair by conventional methods, and because the scour and erosion were still active, rendering any repair attempts useless.¹⁴⁸

213. The Mission also noted that repair or replacement of the weir is meaningless because drainage and tidal water will continue to enter and leave the dhands freely through gaps in the breached embankments. The Mission supported the recommendations to continue monitoring of water levels in the Tidal Link and KPOD for at least one year, and to carry out a survey of the bed levels in the Tidal Link.¹⁴⁹
214. The Panel notes that the situation in the lower Badin area is gradually stabilizing. The LBOD continues to function as a drain. Efforts should continue and be strengthened to reduce the drainable effluent through water management interventions. The drainage water from the LBOD is spilled into the Pateji and Cholri dhands that together with the former tidal link have developed into active tidal systems. Salinity in the two dhands is very high due to the high evaporation and the regular inflow of sea water. Hence the ecology of these dhands has changed completely.
215. The Panel was informed that the Government is constructing a line of dikes to protect some agricultural land south of Badin. The Panel's expert notes that the current plan is that the outfall drains are not equipped with automatic closing devices (flap gates) that would prevent sea water from back-flowing into the drains at high tide.
216. The 2001 Bank Mission also made a suggestion to establish a scientific panel that would review monitoring data and produce an integrated interpretation of the situation and future development.¹⁵⁰ The Panel strongly supports this suggestion. It has, however, not been implemented.

3. Project Completion

217. The NDP Project officially closed as of December 2004. A final implementation review mission was conducted in that same month.
218. The final implementation review mission judged the overall performance of the Project as unsatisfactory, but also described a number of achievements of the Project. These include: helping to clear a backlog of deferred maintenance of the existing system; fostering the decision to carry forward institutional reforms at the highest levels of government in Pakistan; the completion of key policy and sector studies that paved the way for a National Water Policy and drainage sector strategy; enhancing the knowledge base; the organization of a large number of farmer organizations covering an area of two million hectares; and supporting studies and generating discussions on long-term options for sustainable development in the Indus River Basin and, as a consequence, increased awareness of the importance of sound environmental planning and management.

¹⁴⁸ Left Bank Outfall Drain Stage I Project -Tidal Link, World Bank Fact-Finding Mission (Technical note and recommendations), March 18, 2001, ¶s 12-15.

¹⁴⁹ Fact-Finding Mission, March 2001, ¶ 15.

¹⁵⁰ Fact-Finding Mission, March 2001, ¶ 44.

219. The report of the mission, however, appears to overlook major social and environmental issues and problems linked to the Project. The impacts have been particularly severe on the Requesters and the people that they represent. It appears to the Panel that the Project -- like its predecessors -- failed to give adequate attention to the social and environmental problems facing people that were not its intended beneficiaries, but rather suffered from its effects. These issues are discussed in more detail in the following chapters.

Chapter 3: Environmental Compliance

220. This Chapter considers claims that the Bank has failed to comply with its policies and procedures relating to the environment and to natural habitat, in particular OD 4.01 and OD 4.04. It begins with a summary of the claims of Requesters and the Management Response in relation to environmental issues. It then reviews issues of water flow and environmental conditions in the Basin, and how the Project fits within this context. This is followed by an analysis of issues of compliance.

A. Introduction

221. **Claims of Requesters.** As described in more detail in Chapter 1, the Requesters claim that the design of the NDP Project is faulty and unsustainable because it has not taken into account the social and environmental difficulties inherent in the existing disposal route, and because it did not explore alternatives. They note that the failure of the Tidal Link and the Cholri Weir has caused severe damage to the ecosystem, habitat and fish catch of the dhands, and adversely affected the livelihoods of people in some forty villages.
222. They believe that the NDP Project proposed drainage network will badly affect this already degraded environment, and aggravate existing problems. They allege that the NDP Project will lead to the destruction of two dhands that are protected by the Ramsar Convention on Wetlands of International Importance, and other wetlands of high ecological importance and important as fisheries for the local communities.
223. The Requesters consider that the NSDS, centered on the extension northwards of the LBOD as a spinal drain, is by far the major potential investment project within the NDP Project. They believe that “super-engineering ideas” are being used against the natural flows, while alternatives including historical natural disposal systems have been ignored.
224. The Requesters also claim many deficiencies with respect to the Bank’s environmental assessment process, and argue that the analysis in the early 1990’s lacks public legitimacy due to the absence of consultations. They also raise concerns regarding the impacts of the Chotiari Reservoir and embankments, and its effects of displacing thousands of families during its implementation.
225. In sum, they believe that if the NDP Project is implemented according to its original design – and if there is an inter-provincial drainage accord and more trunk drains are connected to the spinal drain of the LBOD – the “*Dhands [...] will be the story of past and people earning their livelihood will be forcibly migrated. This will be yet another example of involuntary displacement of people that is ignored by the official documents of both government and donors.*”¹⁵¹

¹⁵¹ Request for Inspection, ¶ 48.

226. **Management Response.** As described in more detail in Chapter 1, Management acknowledges that there are serious problems in the Indus Delta, and notes the problems of the Tidal Link and collapse of the weir. Management states that the Project was frontloaded with institutional and policy reforms and back loaded with an investment program, in order to focus on strengthening governance and transparency in the irrigation and drainage sector.
227. Management states that the Project is in compliance with many of the requirements for OD 4.01. Regarding the classification of the NDP Project as EA category “B”, Management states that category “A”, would have been more appropriate for the Project. Management states that the 1993 DSEA was accepted by IDA as a sectoral EIA for the Project; and was not updated because *“the primary focus of the NDP Project was sector reform and safeguards for each subproject were built into project design.”*¹⁵²
228. With respect to the consideration of alternatives, Management is of the view that the preparation work for the Project, as well as studies during implementation, sought to consider all reasonable alternatives for disposal. Management refers, in particular, to the five alternatives considered in the 1993 DSEA.¹⁵³ With respect to the question of an EMP, Management states that a detailed design for an EMP is under preparation, but acknowledges that *“no report has yet been prepared on ex-post sampling (...) to ensure compliance with EA policy or the covenants concerning screening in the Project”* and that *“[i]mplementation of the EMP required by the Project Agreement to cover the cumulative basin-wide environmental aspects and implications of the project as a whole has not yet been achieved.”*¹⁵⁴
229. Management states that the NDP Project has not supported investments that directly affect the dhands designated under the Ramsar Convention, the Nurri¹⁵⁵ and Jubho Lagoons, but notes that *“[m]ore detailed assessment is required to determine if these sites are affected by the breaches in the Tidal Link Canal and the collapse of the Cholri Weir.”*¹⁵⁶
230. Management asserts that the NDP Project will not extend the LBOD Spinal Drain any further north. They also specify several actions they will take to review data and harms in the LBOD outfall area and propose corresponding actions.¹⁵⁷

B. Water Flow and Environmental Conditions

231. As described in Chapters 1 and 2, the NDP Project takes place within the broader context of the extensive irrigation and drainage system of the Indus River Basin. This system has significantly altered the Basin landscape and ecology. The irrigation projects made water available for the benefit of agriculture, but also brought significant problems of waterlogging and salinity (the “twin problems”) and changed

¹⁵² Management Response, Annex 1, Item 3, p.18.

¹⁵³ Management Response, Annex 1, Item 4, p. 18.

¹⁵⁴ Management Response, ¶ 43.

¹⁵⁵ The Nurri Lagoon is also referred to as the Narreri, Nerriri, or Nurr-ri Lagoon.

¹⁵⁶ Management Response, Annex 1, Item 16, p. 26.

¹⁵⁷ See Chapter 2 of this Report.

dramatically the natural water flows in the basin. The drainage mechanisms designed to resolve the waterlogging and salinity problems, such as the LBOD, supported agricultural productivity but brought their own ecological consequences.

232. Pakistan is facing a variety of major health and environmental problems linked to inadequate environmental flows. The technical term “environmental flows” refers to the minimum flow of water that should be released in a river below a diversion or “off-take” in order to conserve people’s livelihoods and their environmental support system downstream until the next adequate tributary. Environmental flows are often the main way to ensure that beneficiaries of the river water that is abstracted do not penalize downstream riparians.
233. As a general matter, an assessment is needed to ensure that the benefits to upstream users are not exceeded by the costs to downstream users. As noted in Chapter 1, however, there is a sharp asymmetry of costs and benefits of the irrigation and drainage system in the Basin. In general, the upstream abstracters of the waters (above the Kotri Barrage) who use it for irrigation receive the benefits, while downstream people in Badin and Thatta incur the costs.
234. The most severe impacts, particularly in southern Sindh, have long been well known. They include those listed in Box 1.

Box 1: Health and Environmental Problems and Impacts in the Indus Delta

- Reduction of water supply, and its contamination (by saline drainage and biocides), in Hyderabad, Karachi, Thatta and Badin; damage to 1.5 million acres of farmland in Thatta and Badin (IUCN 2002), causing dislocation and extensive economic losses.
- Saline intrusion up the Indus Delta harming agriculture of the adjacent districts, including Thatta.
- Damage to the mangrove ecosystem, reduction in fish and other aquatic resources, increased erosion of the coast, tidal influence intensifying inland, damage to dhands and inland fisheries. Pakistan’s mangrove area has been halved since the mid-1970s to 158,000ha in 1990; this loss is intensifying - - by 2003 the area was estimated at 106,090 ha.
- Harms to the 150,000 mangrove-dependent people, who are mainly Mallahs.
- Over 600,000ha of riverine forest have been damaged.
- Sedimentation of Karachi Port.
- Less or no water available for the half million people living near the Indus between Kotri and Karachi.
- Endangered wildlife (e.g., Blind Indus Dolphin) is being increasingly harmed.

Source: Panel Expert, based on review of literature and interviews¹⁵⁸

235. One area of major concern is drinking water. Most of Pakistan’s supplies of fresh water are abstracted and allocated to irrigation in Punjab and northern Sindh. Much of Sindh is constrained by shortages of fresh water, particularly in the coastal Sindh districts of Badin and Thatta. The main sources of drinking water in Badin are freshwater irrigation canals, which are affected by dumping of waste water and mixing with drainage water. Drainage effluent is saline and contaminated over time by agricultural run-off and biocides.

¹⁵⁸ For example: Abasi 2002, ActionAid 2004 & 2005, Agarwal & Dubey 2002, Brohi 2004, Eckholm 2003, Gizewski & Homer-Dixon 1996 & 1998, GoS 1999, Habib 2005, 1994, IEP 1998, Inam et al. 2004, IUCN 1991, 2002a & b, 2003a & b, 2004, Leichenko & Wescoat 1993, Memon Y 2004, Memon A 2004 & 2005, Memon & Halepoto 2005, MottMacDonald 1994, PFF 2004, Panhwar 2002, Quereshi 1995, Snead 1988, Sneddon 2002, UNEP 1986, UN ESCAP 1996, Wescoat 2000, WCD 2000.

236. Box 2 provides a summary of information on drinking water supply in Pakistan.

Box 2: Drinking Water Supply and Environmental Flows

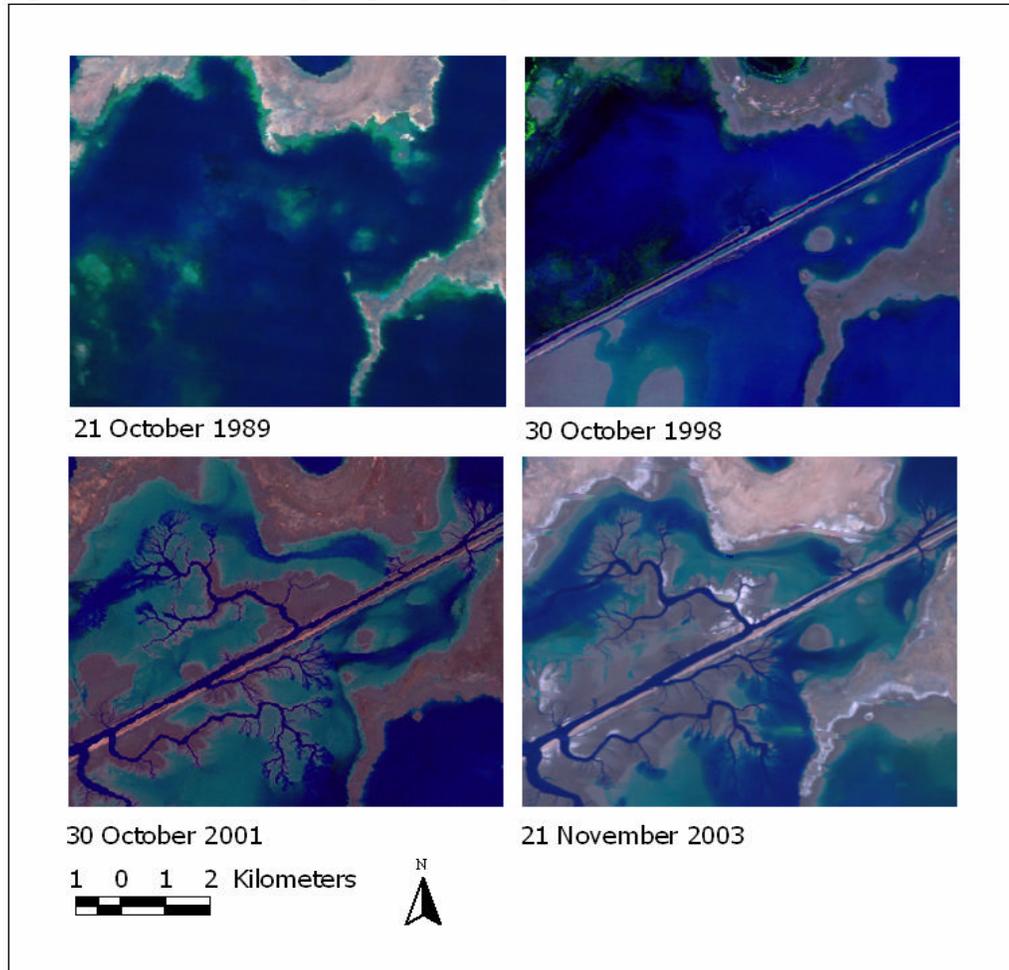
Facts on potable water:

- Potable water is very much a poverty issue as the affluent can buy it if necessary.
- Pakistan is a water-deficient country, despite its massive rivers. The Indus fails to flow into the Arabian Sea for much of the time, at least over the last four years.
- Irrigation consumes 95% of Pakistan's available water resources.
- Water pollution is Pakistan's biggest killer, including 60% of child mortality (IRC 20 Apr '05).
- Southern Sindh's Badin and Thatta districts are the main area suffering from acute scarcity of potable water.
- Alternatives to address the problems of toxic saline effluent in Southern Sindh are available (e.g., *in situ* evaporation ponds, improved water management to decrease the volume of effluent generated).

Source: Panel Expert, based on review of literature and interviews (reference list on file).

237. The LBOD is a component of the overall irrigation and drainage system, designed to support agriculture and help resolve the twin problem of waterlogging and salinity. It has also, however, led to significant adverse effects in the southern portions of Badin and Thatta Districts of Sindh Province, linked to changes in water balance, water flows and salinity. These effects are described in detail in Chapter 2, and noted briefly below.
238. More specifically, the failure of the LBOD Tidal Link has been a major cause of harms to the dhands wetland ecosystem in southern Badin. With the collapse of the Tidal Link weir, the water and salinity balance of the dhands ecosystem has changed profoundly. The Tidal Link flow is now intermingled with the flow to and from the dhands and the Rann of Kutch at every tide cycle through the breaches along the embankments, and salinity of the dhands has risen sharply.
239. This has led to major decreases in birds and waterfowl, the loss of distinctive vegetation and other fauna in the shallower areas of the dhands, and major decreases in fish species and numbers in the dhands. Increased salinity also has affected large areas of agricultural lands (see Chapter 2).

Figure 8: Remote Sensing Image of Changes over Time in the Area of the Cholri Weir



Source: Landsat images, Geocover datasets (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link). See Annex C for more details.

240. Even when the structures were holding, the design of the LBOD system was not in harmony with the wind and natural flow of water. The Tidal Link embankments cut off the four Sindh wetlands, Sanhro Dhand (Jubho Lagoon), Mehro Dhand (Nurri Lagoon), Pateji and Cholri dhands, from the rest of the Rann of Kutch. They also cut off and diverted surface flow essential for grass covers south east of the Tidal Link, and consequently destroyed grazing areas.
241. More broadly, the structures are part of the overall transformation of water flows in the Basin (noted above). The spinal drain and Tidal Link receive waters diverted to irrigation in the north, and channel these waters (transformed into “drainage effluent”) across the dhands into the sea. Portions of the spinal drain fall within the course of an “abandoned” river channel and meandering channel loops, interrupting pre-existing drainage patterns.¹⁵⁹

¹⁵⁹ This is described in more detail in the Left Bank Outfall Drain Stage 1 Project Environmental Management and Monitoring Plan (EMMP), April 1998, p. 1-11 (referring to the portions of the drain between “RD 220” and “RD 265”).

242. The major changes in the morphology and size of the dhands in recent years are described in more detail in Chapter 2. The LBOD system also has increased both the risk and intensity of flooding, with heavy impacts on people in the region (see Chapter 4).
243. The Chotiari Reservoir,¹⁶⁰ another major source of water for irrigation in the region, also is of high environmental significance. In addition to issues of displacement and resettlement (see Chapter 4), the reservoir inundation area covers grazing lands, fisheries and natural reserves. While the civil works were completed under the Project, the Panel is informed that the reservoir has not yet been filled.
244. The NDP Project has supported a variety of actions that have affected, or could affect, environmental conditions of concern to Requesters (see Chapter 2). Its relationship with the LBOD system is of particular importance in this regard.
245. On the one hand, the NDP Project has pursued policy and institutional reforms to build foundations for more socially and environmentally sustainable approaches to resolve drainage problems. At the same time, it has made investments to complete the LBOD -- a drainage system of great concern to Requesters -- and advanced new proposals (both at Project appraisal and through the DMP process) that would expand the scope and/or volumes of waters received through the LBOD.¹⁶¹ In addition, the failure of the Tidal Link occurred during the NDP Project and, for reasons explained in Chapter 1, the Project inherited the task of responding to the environmental and social implications of this breakdown.
246. With this background, the discussion below reviews the questions raised in the Request regarding compliance by the Bank with the Bank's operational policies and procedures, in particular OD 4.01 (Environmental Assessment) and OD 4.04 (Natural Habitat).

C. Environmental Assessment

247. The Requesters claim many deficiencies in the Bank's environmental assessment of the Project. They claim that the Bank violated policy by accepting the 1993 DSEA, because this DSEA focuses only on general environmental issues of Pakistan's drainage sector and does not deal with critical issues of concern to Requesters, including coastal ecology, safe disposal of saline effluent into the Arabian Sea, and protection of wetlands.¹⁶² They state that the EA ignored or underestimated items on the checklist for Bank financed projects and that the economic costs of biodiversity and environmental impacts have been completely ignored.¹⁶³
248. The Requesters add that the DSEA was not updated during consideration of the loan in 1997, and it lacked public legitimacy because no civil society groups were

¹⁶⁰ As noted in this Report, the Chotiari Reservoir is not financed under the NDP Project because of a disagreement over the FLAR, but the Bank retained supervision responsibilities.

¹⁶¹ The relationship between the NDP Project and these proposals, including the NSDS and the NDP Framework Program, is described in Chapter 2.

¹⁶² Request for Inspection, ¶ 33.

¹⁶³ Request for Inspection, ¶ 33.

consulted during its preparation.¹⁶⁴ The Requesters state that although Bank policy calls for an Environmental Management Plan (EMP), “*after the lapse of six years there is no such EMP.*”¹⁶⁵

249. Management believes that the Project is in compliance with many of the requirements of OD 4.01, including preparation of a sectoral EA and requirements for screening subprojects.¹⁶⁶ Management acknowledges that it would have been more appropriate to categorize this as a Category “A” Project, rather than Category “B” as was done based on the submission of the DSEA.¹⁶⁷ Management states that the Bank obtained assurances from the Borrower that all investment projects would have an Initial Environmental Scoping (IES) and that full Environmental Impact Assessments (EIAs) would be prepared to IDA’s satisfaction for those project that the IES indicated have significant environmental effects.
250. With regard to analysis of alternatives, Management notes that the 1993 DSEA considered five alternative models of disposal, reuse, or recycling. With regard to claims relating to the absence of an EMP, Management notes that the design of the Project included preparation of an EMP and that a Water Sector EMP-Framework for action was developed in February 2002 with detailed design for it under preparation.¹⁶⁸
251. The Panel notes that the NDP Project is subject to the provisions of OD 4.01 on Environmental Assessment (October 1991).¹⁶⁹ OD 4.01 states, inter alia, that the purpose of environmental assessment “*is to improve decision making and to ensure that the project options under consideration are environmentally sound and sustainable.*” The analysis of Bank compliance is set forth below.

1. Project Area of Influence

252. A clear understanding of the spatial and temporal parameters of a project being studied is fundamental to its proper evaluation and assessment.¹⁷⁰ The discussion below begins with a review of the definition of project area of influence that was established for the LBOD Project under OMS 2.34. It then proceeds to consider the project area of influence for the NDP Project under OD 4.01.

a. LBOD Project Area

253. At the time of the preparation of the LBOD project, the World Bank did not yet clearly define the area of influence of a project. OMS 2.34 on Tribal People in Bank Financed Projects stated that during project identification “*the approximate numbers, location, and degree of acculturation of tribal people in the general region of the project should be ascertained*” (emphasis added).¹⁷¹

¹⁶⁴ Request for Inspection, ¶ 35.

¹⁶⁵ Request for Inspection, ¶ 37.

¹⁶⁶ Management Response, ¶ 43.

¹⁶⁷ Management Response, ¶ 41.

¹⁶⁸ Management Response, Annex 1, Item 5, p. 19.

¹⁶⁹ OD 4.01 (Environmental Assessment), October 1991, applies to Projects for which the PID is first issued before January 1, 1999.

¹⁷⁰ See OD 4.01, Annex B (Outline of a Project-Specific EA Report), ¶ 2(c) and (d).

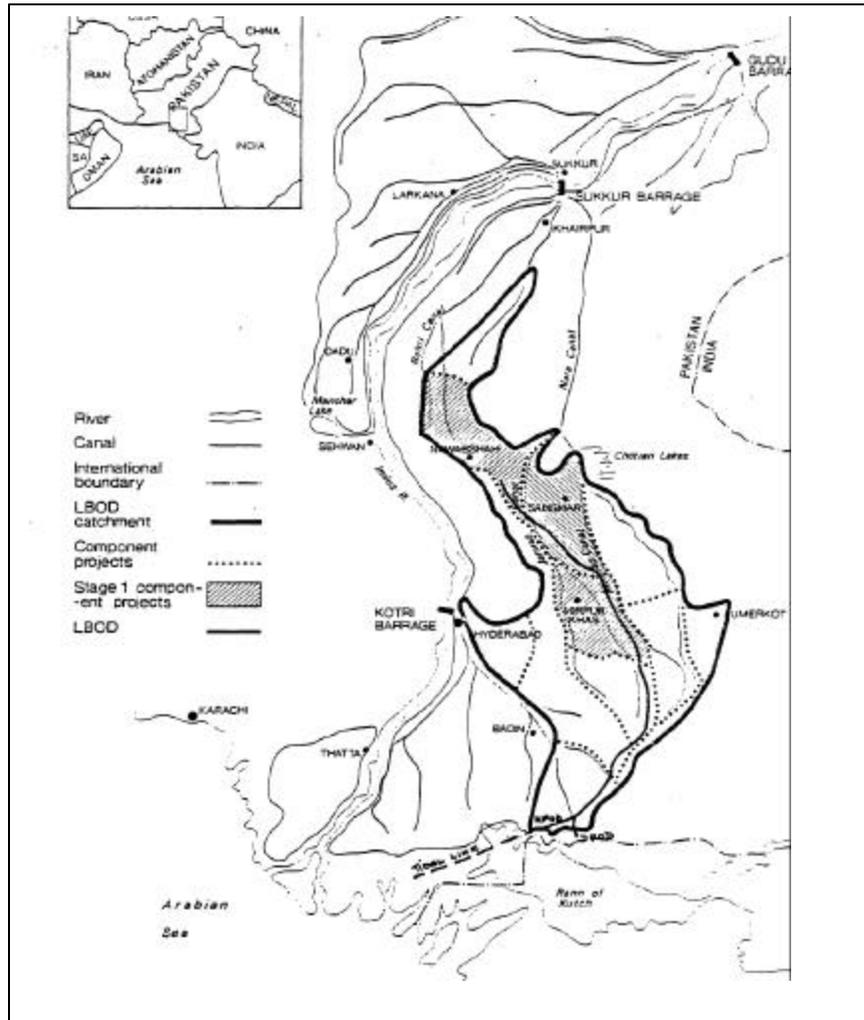
¹⁷¹ OMS 2.34 (Tribal People in Bank Financed Projects), February 1982, ¶ 10.

254. The LBOD Project included major physical projects that were near or within the affected areas of southernmost Sindh:

(i) Spinal Drain

- (a) Completion of a main outfall drain under the Government's Core Program (see attached map);
- (b) Construction of a bifurcation structure at the junction of the Khadan Pateji Outfall Drain (KPOD) and the Dhoro Puran Outfall Drain (DPOD);
- (c) Remodeling of DPOD and KPOD to carry drainage flows from the spinal LBOD and the existing drain from the Kotri command;
- (d) Construction of an outfall from Pateji Dhand to Shah Samando tidal creek;¹⁷²

Figure 9: Core Project Area and Components of LBOD Project¹⁷³



¹⁷² Issues Paper, April 1984, p. 5.

¹⁷³ Issues Paper, April 1984, p. 17.

255. Despite the construction of these major works, the project area as defined by the LBOD Project consisted of the three districts indicated by the shaded areas of the map:

*3.02 Project Area. The project is located in Sind, in the Lower Indus Basin, and serves a gross command area (GCA) of about 578,000 ha, and a CCA of about 517,000 ha in Nawabshah, Sanghar and Tharparkar (Mirpurkhas) districts (...).*¹⁷⁴

256. World Bank staff recognized, but in hindsight obviously underestimated, possible risks to the environment and livelihood of people near the KPOD and Tidal link. They assumed:

*7.11 With adequate safeguards provided in the design of the LBOD-Stage I project (para 3.04), the drainage water in DPOD flowing into Shakoor Dhand would be principally stormwater. Drainage flows from KPOD into the tidal link connecting to the Arabian sea should have no effect on the natural environment, nor should they affect the livelihood of the fishermen in the area.*¹⁷⁵

257. Given the assumptions that there *should be* no adverse effects *if* adequate safeguards are provided in the design, the possible impacts on the *people* of south Badin and Thatta, in particular the possible impacts on the inland and coastal fishermen of these areas, was not adequately assessed, whether in project preparation or during implementation, despite the major physical works undertaken there.

258. The narrow definition of project area carried over into the scope of the LBOD Project socio-economic studies. These studies were intended to assess the project impacts on the project beneficiaries in the three project component areas of Nawabshah, Sanghar and Mirpurkhas,¹⁷⁶ and in particular:

*(...) to assess the project's impact on agricultural production, farmer incomes and employment levels, and, to a lesser extent, on the regional economy (...). [T]hese findings would be used to assess appropriate cost recovery levels from the direct beneficiaries.*¹⁷⁷

259. As confirmed by the Joint Review Mission on the socio-economic impact evaluation studies, the main focus of the evaluation was on the issues raised in the project SAR and *'the on-going biannual agro-economic data collection on 56 watercourses'* in the 3 project component areas.¹⁷⁸ It should be noted that any attempt by the socio-economic impact evaluation study team to expand the scope or area of its studies would likely have met with considerable resistance from the executing agency for the studies, the Planning Department of the Government of Sindh, which had engaged the study team. The two parties had serious disagreements that led to the temporary

¹⁷⁴ Issues Paper, April 1984, p. 4.

¹⁷⁵ SAR (LBOD), p. 45-46.

¹⁷⁶ Issues Paper, April 1984, p. 11. See also Sindh Development Studies Centre, Left Bank Outfall Drain Project, Socio-Economic Impact Evaluation Study, Baseline Report. Vol. 1, Main Report, Jamshoro: University of Sindh, 1992, pp. vii-viii.

¹⁷⁷ Issues Paper, April 1984, p. 11

¹⁷⁸ Left Bank Outfall Drain Stage I Project, Pakistan, Socio-Economic Impact Evaluation Study, Aide Memoire of Joint Review Mission, 28 June – 1 July, 1992, dated July 30, 1992, p. 2

suspension of the study, including disagreements on the purpose of the studies. Bank and other donor staff were mostly concerned with negotiating between the two parties so the studies could be completed as planned.¹⁷⁹

260. The Government of Sindh has since come to accept that “*the non-involvement of stakeholders and locals in the LBOD project created great losses. Since NSDS is a very serious issue, therefore, it must be made open for the discussion of public/farmers/stakeholders through seminars, workshops, etc.*”¹⁸⁰

b. NDP Project Area

261. As indicated above, OD 4.01 requires the careful identification of the area that will be affected by a project. Specifically, it calls for a “*concise description of the project’s geographic, ecological, social, and temporal context, including any off-site investments that may be required by the project (...)*” This is to be based on an “*Assessment of the dimensions of the study area and description of relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Current and proposed development activities, within the project area (but not directly connected to the project) should also be taken into account.*”¹⁸¹
262. The NDP Project, by spanning four provinces, had a broader geographic area than the LBOD project, but made the focus of social analysis narrower. The project covered the entire Indus River Basin,¹⁸² yet social assessments were limited to specific sub-projects, and this meant that the assessments only covered those people within the area of each specific sub-project.¹⁸³
263. According to the Staff Appraisal Report for the NDP Project, “[a]ll drainage facilities financed under the project must also be linked with sub-basins, and then to outfalls which must ultimately connect to the Arabian Sea either through the LBOD Spinal Drain or via the Indus River.”¹⁸⁴ Two major works under the NDP Project were expected to be the “(a) rehabilitation and remodeling of the LBOD Spinal Drain

¹⁷⁹ Joint Review Mission (LBOD), Aide Memoire, pp. 2-3.

¹⁸⁰ Pakistan National Surface Drainage System (NSDS) Panel Consultation: Review Report, Draft Final Report, Islamabad, April 23, 2003, “Comments from the Government of Sindh,” p. Annex 5-9.

¹⁸¹ OD 4.01, Annex B, ¶ 2 (c) and (d). In 1989 the Bank clarified the “*area of influence of a project*” in its Environmental Policy for Dams and Reservoirs (OD 4.00, Annex B, dated April 1989) and adopted that definition in 1991 for its broader policy on Environmental Assessment (OD 4.01, dated October 1991). The Bank’s definition of “*area of influence of a project*,” is included in OD 4.00 at Annex B (¶3) and Annex B2 (The Area of Influence of Dams and Reservoir Projects, dated April 1989). OD 4.00, at Annex B2, states: “*The area of influence of dams and reservoir projects includes the following: [...] all ancillary aspects of the project such as power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, and construction camps, as well as unplanned developments arising from the project (e.g., logging or shifting cultivation along access roads); [...] off-site areas required for resettlement or compensatory tracts [...]; migratory routes of humans, wildlife, or fish – particularly where they relate to public health, economics, or environmental conservation.*”

¹⁸² Memorandum and Recommendation of the President of the International Development Association to the Executive Directors on a Proposed Credit in the Amount Equivalent to SDR198.6 Million to the Islamic Republic of Pakistan for a National Drainage Program Project, September 25, 1997, p. 3.

¹⁸³ SAR (NDP) p. 33.

¹⁸⁴ SAR (NDP), p. 12.

(\$39.6 million); [and] (b) remedial works on the Tidal Link (\$11.7 million).”¹⁸⁵ Yet the people in south Badin, where most waters of the LBOD flowed through and where the work on the Tidal Link was to be carried out, were not included in any assessment. According to the Management Response, social assessments for these components were not necessary because they were ‘*rehabilitation and improvement of existing infrastructure*.’¹⁸⁶ It would be reasonable, however, to assess whether or not further work on the LBOD and other infrastructure might affect the people where that work will occur, rather than assume that there will be no effect.

264. The Drainage Sector Environmental Assessment (DSEA), accepted by the World Bank as the Environmental Impact Assessment for the NDP Project,¹⁸⁷ might also have been expected to address the possible impact of the drainage program on the people of south Sindh and their livelihood. The coverage of social issues in the DSEA is commendable for a document that is largely dominated by biological and engineering issues and that does not have a specialist specifically designated to deal with social, ethnographic, or cultural issues.¹⁸⁸ There is even discussion of the possible impact on ‘*Nomadic Groups*’ if drainage water is occasionally released in the scrub lands or desert used by these groups,¹⁸⁹ and on the potential impact on loss of grazing resources for nomadic groups in north Sindh (around Hamal Lake and Sukkur), Balochistan, and NWFP.¹⁹⁰ It was also noted that ‘*any such infringement automatically places developments in Category A, for which a full EIA is mandatory*.’¹⁹¹

265. There is mention in the supplementary report on the fisheries sector of the DSEA of possible impacts of changes in water salinity on fishing resources in the dhands of south Badin and Thatta, and that this might affect the people of the area who depend upon those resources:

The thirty year record shows some progressive fishing activities, fishermen settlements with boats and villages with inhabitants earning their livelihood from other business vis sale of oil extracted from the viscera of fishes, sale of crocodile Hides and sale of lotus seed collected from the dhands growing there on considerable quantity.

*Since then there is no such detailed information as the fate of fishery resource of the Dhands. Presuming if most of the fishery resources are turned to saline and those saline turned to Brackish, then at least some have to think on the fate of the villagers settled there depending on other trade like crocodile hide sale and lotus fruit harvest. This might be a sociological issue as these dhands and wetlands becomes dry with the implementation drainage programme.*¹⁹²

¹⁸⁵ SAR (NDP), p. 71.

¹⁸⁶ Management Response, Annex 1, Item 21, p. 29.

¹⁸⁷ SAR (NDP), p. 34.

¹⁸⁸ DSEA June 1993, Main Report Volume 1, Chapter 6.

¹⁸⁹ DSEA June 1993, Main Report Volume 1, p. 6-23.

¹⁹⁰ DSEA June 1993, Main Report Volume 1, p. 6-20.

¹⁹¹ DSEA June 1993, Main Report Volume 1, p. 6-20.

¹⁹² DSEA June 1993, Supplementary Reports Volume 3, p. 25.

266. **Despite these references in the DSEA, there did not appear to be any further study of the possible impacts of the drainage program on the people who depended upon the dhands for at least part of their livelihood, nor of any possible impact of increased drainage waters flowing through the Tidal Link.**

c. Determination of the Project Area

267. The area covered by the Requesters' claim falls within the general area of the LBOD project and within the project area of influence of the NDP Project. **The Panel finds that under the NDP Project, however, neither the potential environmental nor the potential social impacts of the Project in the area of concern to Requesters were considered in a meaningful way until the submission of the Request.** This is discussed in more detail below.

268. **By comparison, the Panel finds that environmental and to some extent social issues relevant to the area of the Request were given consideration under the LBOD project during the design and implementation of the Tidal Link. However, once the system began to break down, Management focused on technical problems (e.g., the erosion of the Tidal Link channel bed and embankments) but did not succeed in bringing the necessary attention to the social impact of the failing structures.** This is discussed in more detail in Chapter 4 (Social Compliance) and Chapter 5 (Supervision).

2. Environmental Screening and Level of Analysis

269. "Environmental screening" is essential to environmental assessment under OD 4.01, and "*determine[s] the extent and type of environmental work required*" to a given Project.¹⁹³ Screening assigns a project to one of three categories. Category "A": a full EA is required; Category "B": environmental analysis is required but not a full EA; Category "C": no EA or environmental analysis is required.¹⁹⁴

270. OD 4.01 provides that a project is classified as Category "A" if it "*is likely to have significant adverse impacts that may be sensitive, irreversible and diverse.*" By comparison, a proposed project is classified as Category B if it may have adverse environmental impacts that are "*less significant (...) [t]he impacts are not as sensitive, numerous, major or diverse (...) remedial measures can be more easily designed.*"¹⁹⁵

271. The analysis contained in a Category "A" EA is broader and more detailed than that contained in other EAs. Important elements of particular relevance to the present situation include: an assessment of baseline data; a systematic analysis of alternatives; a mitigation or environmental management plan; and an environmental monitoring plan.¹⁹⁶ Meaningful consultations with people likely to be affected by proposed actions, and timely disclosure of proposals, also are essential ingredients of the EA process and informed decision-making. An appropriate EA process is a key tool to enable local communities to have a voice and role in actions that may affect them.

¹⁹³ OD 4.01, ¶ 17.

¹⁹⁴ OD 4.01, ¶ 17.

¹⁹⁵ OD 4.01, Annex E, ¶ 5.

¹⁹⁶ OD 4.01, Annex B, ¶ 2.

272. The Panel notes in this regard that the Project contemplated not only institutional and policy actions but also significant infrastructure investments, including completion of the LBOD and the Chotiari Reservoir. The LBOD system, as noted above, has brought major environmental consequences to southern Sindh in the form of disrupted water flows and elevated salinity in the waters and ecosystem.¹⁹⁷ The existing drainage system also brings waters contaminated by agricultural run-off and biocides.
273. Given the risks and environmental consequences associated with the LBOD, a Project designed to complete and maintain it, and to make other significant drainage investments, deserves high environmental scrutiny. **Further development of the LBOD is intended to improve drainage but, in addition, had and has the potential to intensify significantly harms to people and the environment generated by the existing system, especially in southern Sindh.**
274. The NDP Project also was designed to lay the foundation for the long-term approach to drainage in the Basin. At the time the screening decision was made, the envisaged approach included the NSDS drainage superhighway, and the investment budget was very substantial. This planning for the long-term had major environmental implications, especially for those at the downstream end of the system in southern Sindh. **The development of such a long-term approach could help to resolve existing problems, but also could also create the possibility of significant, irreversible environmental harms and cumulative impacts.**
275. The Bank assigned the NDP as “Category B” under OD 4.01. **Management has acknowledged that “Category A” would have been more appropriate.**¹⁹⁸ **The Panel notes this acknowledgment,** and believes that Management should have realized that the overall Project concept posed significant environmental risks and the potential for far-reaching environmental impacts. **The Panel finds that the decision of the Bank to categorize the Project as “Category B,” rather than “Category A,” did not comply with OD 4.01.**

3. Analysis of Alternatives

276. The purpose of environmental assessment is to improve decisions by making appropriate choices. It follows that careful comparison of realistic alternatives is an important feature of environmental assessments. Without systematic consideration of realistic alternatives, any environmental assessment is seriously flawed. Under OD 4.01, the analysis of alternatives enables decision-makers to consider options to prevent, minimize, mitigate or compensate for adverse impacts. For each alternative, the *“environmental costs and benefits should be quantified to the extent possible.”*

¹⁹⁷ See Chapter 2 of this Report.

¹⁹⁸ In its Response, Management indicates that during the 1990’s, the Asia environment department placed some relatively large projects in Category B (“the big Bs”). It notes that *“such categorization appears to have reflected a premature (pre-EIA) balancing of possible adverse effects with positive effects, and a focus on individual infrastructure activities, without regard to their potential cumulative effects.”* Management states that this practice of “Big B” categorization has ceased. Management Response, ¶41.

277. The Requesters state that the feasibility and sustainability of the NDP Project “depends on the sound foundations of the LBOD because it is a final disposal point of drainage effluents”, and that “[t]he design of NDP has entirely ignored the current reality and the social and environmental problems of the existing disposal route, and never explored the alternatives.”¹⁹⁹ The Requesters also state the 1993 DSEA was prepared when the technical problems of the LBOD system were not obvious, and that the DSEA was not updated during the consideration of the NDP Project loan in 1997.²⁰⁰
278. In its Response, Management refers to the 1993 DSEA, which contained an analysis of different alternatives for drainage-sector actions. Management also notes “preparation work for the NDP,” and the fact that the NDP Project included provision for feasibility studies of the NSDS.²⁰¹
279. The 1993 DSEA contained substantial information regarding environmental conditions in the Basin, and the effects of irrigation and drainage infrastructure up to that point in time. **On these issues, the Panel commends the Bank and the Borrower for their efforts and analysis.**
280. **The Panel notes, however, that certain problems arise in relying on the 1993 DSEA analysis of alternatives.** The DSEA was completed in 1993, several years before the beginning of the NDP. In the present situation, some critical events occurred in those years. As noted above, the LBOD outfall system was showing significant signs of damage at least as early as 1996, and in 1998-1999 suffered a major collapse. This collapse -- not addressed or foreseen in the earlier DSEA -- profoundly altered environmental conditions in the region.
281. A review of the 1993 DSEA analysis illustrates the concern. It identifies five drainage options: a) re-use of effluent; b) recycling of effluent; c) disposal into lakes; d) disposal into evaporation ponds; and e) disposal into sea. This last option contains the proposal to use the LBOD to convey the saline sub-surface drainage effluent to the sea, stating that “[i]n Phase I, the LBOD extends 160 miles inland (...).” A separate section is devoted to the long-term scenario.
282. The assessment of this LBOD extension option in the 1993 DSEA states as follows:
- “Environmental studies carried out by Mott MacDonald International (MMI) for LBOD anticipate no appreciable environmental effects.”*²⁰²
283. **In other words, and in the context of its time, the 1993 DSEA suggested that there would be no appreciable environmental effects from the expansion of the LBOD.** It then noted that none of the other options, which involved “disposal within the system,” seemed environmentally acceptable on a large scale or on a permanent long-term basis.²⁰³ On this basis, the DSEA concluded that the option to extend and

¹⁹⁹ Request for Inspection, ¶ 14.

²⁰⁰ Request for Inspection, ¶ 35.

²⁰¹ Management Response, Annex 1, Item 4, pp. 18, 19.

²⁰² DSEA June 1993, Main Report Volume I, ¶ 5.2.5(e).

²⁰³ DSEA June 1993, Main Report Volume I, ¶ 5.2.5(f).

enlarge the LBOD system “*seems at present to be the only one which, if feasible, could maintain permanently the present – and still developing – irrigation system which is so crucial to Pakistan.*”

284. The 1993 DSEA also did not include improved water management and user practices as a basic alternative (these were, however, included within NDP Project actions).²⁰⁴ In this regard, various techniques could be relevant to reduce use of water and other inputs (e.g., fertilizer, pesticides). These include improved efficiency of water use (e.g., trickle versus spray irrigation), integrated pest management methods (e.g., use of pest-resistant crop varieties, use of natural enemies of expected pests), crop selection (use of drought-tolerant crop varieties or crops that do not use as much water, such as switching from cotton to orchards), “just-in-time” field monitoring to ascertain optimal timing (when irrigation would be most effective), optimal volumes (how much water would be sufficient) and others.
285. **The Panel finds that the 1993 DSEA analysis of alternatives rapidly became out of touch with the situation on the ground. Most importantly, the analysis underestimated the potential negative environmental effects in southern Sindh of relying upon and expanding the LBOD. As a result, it did not provide an adequate basis to inform decision-making for the NDP Project on the core question of available alternatives, as required under OD 4.01.**

4. Analysis of Potential Impacts

286. OD 4.01 provides that “[a]ll environmental consequences should be recognized early in the project cycle and taken into account in project selection, siting, planning, and design.”²⁰⁵ The analysis should include an “[i]dentification and assessment of the positive and negative impacts likely to result from the proposed project.” Among other things, “[m]itigation measures, and any residual negative impacts that cannot be mitigated.”²⁰⁶
287. The 1993 DSEA analyzed various potential impacts of actions on drainage, but paid little attention to potential impacts on the environment and on non-Project beneficiary communities at the downstream end of the drainage system in southern Sindh. It contains little or no analysis, for example, of the potential environmental implications of the NDP upon coastal ecology and protection of the dhands. The issues raised in the DSEA in relation to wetlands relate rather to the effect of drainage on water tables: “*The negative impacts of drainage on [wetland] wildlife are exerted almost exclusively through changes in wetlands resulting from the reduction of water tables.*”²⁰⁷
288. The lack of analysis of these impacts might be linked, in part, to the fact that the DSEA was developed before the breakdowns in the Tidal Link. The extent to which the Bank reacted to these changing conditions, and adjusted its analysis, is discussed

²⁰⁴ See e.g., in SAR (NDP), discussion of institutional arrangements and payment systems to levy and collect charges for irrigation and drainage to promote a more rational use of water.

²⁰⁵ OD 4.01, ¶ 2.

²⁰⁶ OD 4.01, Annex B, ¶ 2(e).

²⁰⁷ DSEA June 1993, ¶ 6.3.4.

in more detail in Chapter 5 (Supervision). For the present purposes, **the Panel finds that the 1993 DSEA analysis failed to identify and assess adequately critical environmental concerns of relevance to the affected areas in southern Sindh Province.**

289. The Panel notes that the Project's Implementation Volume (PIV) states that the Indus Basin has "*a number of ecologically sensitive wetlands, many of them located in the Lower Indus Delta (e.g., Lower Nara and the Rann of Kutch),*" and that "[t]hese wetlands contain some of the world's most important wildlife resources, including bird nesting grounds." The document adds that "*uncontrolled irrigation and drainage in and around such wetlands (especially in the Kotri Barrage command) poses threats to their survival.*"²⁰⁸
290. The document does not, however, provide an analysis of how the NDP Project -- which at that time was laying the foundation for the NSDS -- might affect these wetlands. Indeed, the heading of the discussion of wetlands is "*Cultivation and Reclamation of Wetlands*", suggesting that concerns related to increased salinity, chemical contamination and reduced water flow were not identified or considered. On the contrary, the title suggests that the PIV contemplated conversion of wetlands to agriculture by reclamation or draining them, rather than conservation of wetlands.²⁰⁹ Similarly, the SAR itself postpones assessment of impacts until after appraisal, but before specific investments having significant impacts.²¹⁰ **The Panel finds that Project documents noted the issue of potential impacts upon wetlands in southern Sindh, but did not assess how the Project might affect those wetlands or identify required mitigation measures at the critical stage of Project design and appraisal, as called for under OD 4.01.**²¹¹

5. Environmental Management Plan, Mitigation and Compensation

291. A Category "A" EA includes an environmental mitigation or environmental management plan that identifies "*feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels (...)*"²¹² It sets forth details to help ensure that the proposed environmental actions "*are in phase with the proposed engineering or other project activities throughout implementation.*"²¹³ The Plan also "*should consider compensatory measures if mitigation measures are not feasible or cost effective.*"²¹⁴
292. The 1993 DSEA stated that the dynamic nature of the Indus wetlands "*demand that an effective National Wetlands Management Plan be adopted.*"²¹⁵ The Implementation

²⁰⁸ Implementation Volume to Staff Appraisal Report, Volume 1, November 1997, Section 11, ¶ 10 [hereinafter "PIV (NDP)"].

²⁰⁹ Compare discussion in PIV (NDP).

²¹⁰ SAR (NDP), ¶ 4.16.

²¹¹ The extent to which analysis was carried out subsequently is addressed later in this Chapter and in Chapter 5 (Supervision).

²¹² OD 4.01, Annex B, ¶ 2(g).

²¹³ OD 4.01, Annex B, ¶ 2(g).

²¹⁴ OD 4.01, Annex B, ¶ 2(g). See also Annex C.

²¹⁵ DSEA June 1993, ¶ 6.7.4.

Volume to the SAR for the NDP Project identifies several activities for the Project's EMP. These include:

*“(a) environmental coordination; (b) establishment of an environmental baseline based on a sound spatial framework identifying agro-ecological zones; (c) environmental assessments; (d) identification of ameliorative measures; (e) design and implementation of those measures and an Environmental Monitoring and Evaluation System (EMES); (f) design and implementation of the project's Environmental Awareness Program; (g) design and implementation of the project's Wetlands Management Plan (WMP); and (h) expansion, upgrading and operation of the Environmental Data Management System (EDMIS).”*²¹⁶

293. The Project Implementation Volume adds that “WAPDA and the Provinces would implement the EMP for the project as a whole dealing with the cumulative basin-wide environmental aspects and implications; and environmental mitigation or enhancement measures indicated in the EIAs for individual Investment Projects, to the satisfaction of IDA.”²¹⁷ It further states that the WMP will focus on “critical wetland areas affected by the IBIS” and will include “mitigating measures (where applicable), specifications and recommendations on irrigation and drainage planning, and measures to improve wetlands protection.”²¹⁸ It specifies particular actions to be taken by WAPDA and the Provinces to avoid the risk that wetlands may be reclaimed through drainage.
294. **The basic NDP Project documents discuss the EMP and outline important actions to be further developed and implemented** The Project envisioned that this task would largely be the responsibility of WAPDA and the Provinces, subject to the approval of IDA.
295. As acknowledged by Management, there have been significant challenges and shortcomings in the further development and implementation of the specified actions and mitigation measures. In its Response, Management notes that implementation of the EMP, required by the Project agreement to cover cumulative basin-wide environmental aspects and implications of the Project as a whole, has not yet been achieved.²¹⁹ Management separately states that a Water Sector “EMP-Framework for Action” was developed in February 2002 “with the detailed design for it under preparation.”²²⁰ Management also states, in its Response, that the Wetland Management Plan “is called for.”²²¹
296. The Panel considers that EMP activities for the Project needed to adapt to changing conditions on the ground, including in particular the breakdowns of the LBOD Tidal Link. This is of particular significance in the present context given the failure,

²¹⁶ SAR (NDP), ¶ 4.17.

²¹⁷ PIV (NDP), Section 11, ¶ 14.

²¹⁸ PIV (NDP), Section 11, ¶ 16.

²¹⁹ Management Response, ¶ 43.

²²⁰ Management Response, ¶ 43.

²²¹ Management Response, Annex 1, Item 5, p. 19, notes that a separate Wetlands Action Plan has been prepared by the NGO WWF.

acknowledged by Management, to implement the earlier Environmental Monitoring and Management Plan (EMMP) developed in 1998 for the LBOD project.²²²

297. The Tidal Link Fact-Finding Mission in March 2001 identified specific actions to respond to problems of the Tidal Link, including livelihood problems for fishermen and farmers.²²³ The draft EMP Framework developed under the NDP Project in February 2002 reflects further efforts under the Project to develop and implement the Project EMP.²²⁴ Management highlighted the stakes involved in this effort, indicating that the “*lack of progress*” in developing an EMP for NDP was a “*critical problem*.”²²⁵
298. Management noted, however, that “*there is no established institutional framework for such a plan*.”²²⁶ In addition, Management states that while data collection coordinated by WAPDA has continued, the strengthened program of monitoring and analysis recommended by the Tidal Link Fact-Finding Mission in March 2001 was not undertaken as recommended and, as a result, “*mitigation measures have not been identified and decided*.”²²⁷
299. While the Project identified a number of important actions to be undertaken for a Project EMP, many of these were not implemented and, in some cases, not fully developed. The Panel also notes the acknowledgement by Management that there was a failure to implement the EMMP for the (preceding) LBOD project. **The Panel finds that there has been a failure to develop and, in particular, to implement an EMP for the Project. This does not comply with OD 4.01. The EMP and its implementation are crucial to an Environmental Assessment.**
300. The Panel is aware of the challenges faced by Management and the Project in completing these actions. Management stated, in its Mid -Term Review, that there was no established institutional framework for such a plan.²²⁸ The EA team is expected to assess the capacity of the borrower to implement findings, especially the EMP. If

²²² A separate Environmental Management and Monitoring Plan (EMMP) was prepared for the LBOD Project in 1998, following the close of the LBOD Credit and the approval of the NDP Project (both in December 1997). See LBOD Stage I Environmental Management and Monitoring Plan, April 1998. The EMMP notes, among other things, the issue of “*highly saline (and possibly polluted) effluent*” flowing into the Tidal Link and dlands area, and states the objectives to identify options to mitigate negative impacts and restore degraded natural resources. Management acknowledges in its Response, however, “*the failure to implement the LBOD EMMP*,” adding that “*apart from ongoing bathymetric and hydrographic surveys of the Tidal Link canal by the National Institute of Oceanography (NIO) and water table and salinity monitoring by WAPDA’s SCARP Monitoring Organization (SMO), no further studies have been carried out, and no ecological monitoring, analysis or management of the situation in the area is taking place*.” See Management Response, ¶ 32.

²²³ This document is reproduced as Annex 8 of the Management Response. See also Management Response, ¶ 38.

²²⁴ Basin Wide and Provincial NDP Environmental Management Programme Phase II, Water Sector Environmental Management Plan – Framework for Action, February 2002.

²²⁵ National Drainage Program (NDP) Mid-Term Review (MTR) Mission, Draft Mission Findings and Recommendations, April 9, 2001, p. 7. Management added that “[*there are significant risks associated with NDP. It will not be enough to reduce water -logging and salinity if at the same time valuable wetlands and freshwater lakes, the quality of drinking water and people’s health, and the coastal zone and other valuable ecosystems end up irreversibly contaminated and degraded. Substantial input from the EMP would need to guide the preparation of the drainage master plan.*”

²²⁶ MTR (NDP), p. 7.

²²⁷ Management Response, Annex 1, Item 19, p. 28.

²²⁸ MTR (NDP), p. 7.

capacity is inadequate, the EMP seeks to strengthen it. **The Panel notes the concerns expressed by Management that the institutional framework for an EMP was not in place, and recognizes the challenges under the Project in developing and implement such a Plan. Nevertheless, the failure to do so in line with OD 4.01 has been a major obstacle to the ability of the Bank to respond to the concerns of the Requesters in this Project.**

301. A major claim of Requesters is that they should receive compensation for the environmental and social harms that they have suffered as a result of the NDP Project and inter-related elements of the LBOD system. The Panel considers that the Requesters have suffered great harm and hardship, which is in a significant part a result of these structures and their failures.²²⁹ The Panel further notes that the decision not to repair the Tidal Link, on grounds of feasibility, has allowed negative effects on Requesters to continue. **The Panel notes that the NDP Project inherited a responsibility to address the breakdown of the Tidal Link, including the social and environmental consequences.**
302. As noted above, OD 4.01 provides that an environmental mitigation or management plan “*should consider compensatory measures if mitigation measures are not feasible or cost effective.*”²³⁰ The Bank agreed to provide funds to rehabilitate/repair LBOD structures. In 2001, however, Bank and GoS experts determined that it was not technically feasible to repair the Tidal Link. **The Panel notes that, during the course of the NDP Project, significant funds were re-allocated to address needs as they emerged during implementation. Among other things, Project records indicate that US\$135 million was shifted to address problems relating to the drought (see also Chapter 4, discussion of OP 8.50 – Emergency Assistance).**
303. The Panel examined whether there was evidence that Management considered compensatory measures for project affected people. Management informed the Panel that the GoS wrote to the Bank (letter dated May 2003) to request funds for restoration of damages inflicted on LBOD, KPOD and DPOD. In its answer to the GoS (letter dated June 7, 2004), Management wrote that NDP funds could be used to restore damaged systems and then stated as follows: “[w]e therefore suggest the use of Project funds to help in the mitigation of possible flood damages to people, livestock, farms and farm structures.” Management stated that if GoS wanted to use the funds for this purpose, it would be happy to assist “*considering that there might arise an emergency situation in the coming few months.*”
304. **The Panel notes Management’s suggestion to make funds available to mitigate flood damages to people. As the Panel was finalizing its Report, Management also informed the Panel that funds have been provided to some individuals and families affected by the floods. This included “death compensation” to the legal heirs of 318 people, including 125 in Badin and Thatta, in the amount of Rs.100,000 (about US\$2,000) for “bread earner” and Rs.50,000 (about US\$1,000) for non-bread earner. Compensation was also provided for tens of thousands of fully damaged**

²²⁹ The harms to people and the environment, including loss of life in storm floods, loss of fisheries and grazing areas, and harms (from salinity and changed water flows) to agricultural lands and the dhands ecosystem, are described in other sections of this Report (Chapter 2 – overview; Chapter 3 – environment; Chapter 4 – social).

²³⁰ OD 4.01, Annex B, ¶ 2(g). See also Annex C.

and partially damaged houses, including over 100,000 in total in Badin. The compensation for fully damaged houses was at Rs.5,000 (about US\$100) paid to the “main affectees” in Tharparkar, Thatta, Badin and Hyderabad.²³¹

305. **Management did not provide further information on what had been considered and done with respect to compensation in relation to the Project, including whether these payments referred to compensation for losses and/or income restoration. The Panel notes that significant Project funds seem to have been available, and were re-allocated under the Project to address other needs, including US\$135 million for drought relief actions not related to the Project.**
306. **The Panel notes Management’s recent action to carry out a socioeconomic study of the livelihood of the people living in the affected area, and related planned actions. The Panel observes that this could yield new action in line with OD 4.01, as discussed above.**
307. Following the Request for Inspection, and at the request of the GoS, Management also assembled an International Panel of Experts (IPoE) to review the performance of the LBOD system and recommend next steps. The IPoE issued its report in May 2005.²³² **The Panel notes that several recommendations of the IPoE are designed to respond to the many problems facing the local communities living near the Tidal Link and dhands, including problems of sea water intrusion, flood risk, damage to the dhands, and negative impacts on livelihoods.**
308. There remains, however, the question of whether and how these recommendations will be implemented. The Panel observes that there have been significant shortcomings in implementing previously proposed recommendations to address problems faced by local communities. The Panel notes the critical importance of consultation with affected communities, especially in light of the IPoE discussion of conditions for possible northward extension of LBOD, a matter of central concern to Requesters.

6. Monitoring Plan

309. An “Environmental Monitoring Plan” is another key element required in a Category “A” EA under OD 4.01.²³³ This plan should specify the “*type of monitoring, who would do it, how much it would cost, and what other inputs (e.g., training) are necessary.*”

²³¹ Documentation provided to Panel by Management.

²³² Pakistan: Review of the Performance of the Left Bank Outfall Drain Stage I (KPOD, DPOD, Tidal Link and Cholri Weir): Report of the World Bank International Panel of Experts, May 2005.

²³³ OD 4.01, Annex B, ¶2(i).

310. In relation to monitoring, Management refers to an ADB Aide Memoire of September 2004, which indicates steps to ensure implementation of monitoring activities. The Panel also notes that the NDP Project funded a monitoring program by the National Institute of Oceanography (NIO) and the WAPDA monitoring cell since 1999. Management acknowledges, however, that no report on *ex post* sampling of ongoing work has yet been prepared, and that the strengthened program of monitoring and analysis recommended by the 2001 Bank Fact-Finding Mission has not been undertaken as recommended.²³⁴ **The Panel notes this acknowledgment. The Panel commends Management for supporting the NIO monitoring program activities but finds that a comprehensive analysis and interpretation of data is still absent.**

7. Consultation

311. Under OD 4.01, the Bank expects the Borrower to take fully into account the views of affected groups and local NGOs in project design and implementation, in particular in the preparation of EAs. This process is important in order to understand the nature and extent of any social or environmental impacts, and the acceptability of proposed mitigation measures, particularly to affected groups.

312. Such consultations should occur at least at the following two stages of the EA process: (a) shortly after the EA category has been assigned, and (b) once the draft EA has been prepared.”²³⁵ While the primary responsibility for consultations lies with the borrower, Paragraph 3 of Annex D of OD 4.01 states that “[t]he Bank should ensure that the TORs [for the EA] provide for adequate interagency coordination and consultation with affected groups and local nongovernmental organizations (NGOs).”²³⁶ Paragraph 8 of Annex 8 highlights the role of the project Task Manager.²³⁷

313. The record of consultation with affected groups and local NGOs with respect to the LBOD and the NDP Project, and issues of compliance and non-compliance with Bank policies, is examined in detail in Chapter 4 (Social Compliance) of this Report.

8. The Drainage Master Plan (DMP)

314. The Panel considers that the funding of the development of the DMP is one of the most significant activities of the NDP Project. As described above, the DMP is designed to deal in a constructive way with many of the problems that have arisen in connection with drainage in the region, and contains ambitious and wide-ranging new plans, including for infrastructure, to address drainage needs in the Basin. **The DMP is likely to have major environmental and social implications for a long time.**

²³⁴ Management Response, ¶ 43. The Bank 2001 Fact-Finding Mission found that an updated Environmental Management and Monitoring Plan (EMMP) for LBOD Stage I was prepared in 1998, but that there was (and still is) “a lack of a complete baseline and continuing, systematic, scientific and well coordinated monitoring and study (...)” of the Tidal Link and the surrounding impacted communities and wetlands.

²³⁵ OD 4.01, ¶ 20.

²³⁶ OD 4.01, Annex D, ¶ 3.

²³⁷ It states that “[i]n addition, in view of the need for the borrower to take the views of affected groups and local NGOs into account, the Task Manager ascertains the nature of the consultations undertaken with such groups and assesses the extent to which their views have been considered.”

315. The Panel notes that a basic element of the overall environmental assessment strategy of the NDP Project was to carry out EAs for Investment Projects which Initial Environmental Scoping (IES) indicated would have significant environmental impacts.²³⁸ The Panel also notes that the Project carried out an initial screening in the preparation of the draft DMP to determine into which category of EA it should be placed.
316. To the Panel's surprise, the draft DMP was designated as a Category "B" project under Bank (and Asian Development Bank) policies.²³⁹ This assignment was made notwithstanding the fact that it contemplated not only multiple projects over years, but also the TBOD -- a major new drainage infrastructure investment and northward extension of the LBOD.²⁴⁰
317. The international Panel of Experts (IPoE) that reviewed the draft DMP in December 2004 urged that the TBOD option not be considered anymore. It also stated that "[g]iven the magnitude of the Programme, a Category A would be required." The IPoE elaborated upon its concerns with the analysis in the IEE:
- "stating that the construction of the TBOD has no major influence on hydrology is difficult to envisage. No attention is paid to potential off-site impacts, such as changes in volume and quality of water in the lower reaches of the Basin (...). No attention is being paid to the problems that the LBOD is facing at the outfall."*
318. **The Inspection Panel finds that the development of the DMP merited a Category "A" designation under OD 4.01, and that the designation of it as Category "B" did not comply with Bank policy.** The proposed TBOD, among other elements of the draft DMP, had the potential to lead to high adverse environmental consequences that may be sensitive, irreversible and diverse within the meaning of OD 4.01.
319. **As described previously, the final version of the DMP was released while the Panel was finalizing its Report, and appears to have modified substantially the draft version of August 2004.** Among other things, it makes little mention of an expansion in the drainage system along the lines of the TBOD or NSDS. At the same time, it does appear to retain major plans for increasing the flow of effluent into the LBOD within Sindh province.
320. **The Panel notes that the final DMP includes a provisional Environmental Assessment and a framework for environmental management,²⁴¹ and that there are plans for "detailed environmental study" on the DMP's effects on minority groups or tribal minorities.²⁴²** In addition, the Panel notes that while the DMP overall was designated as Category B, the draft DMP stated that it "*shall also be*

²³⁸ SAR (NDP), ¶ 43.

²³⁹ See draft DMP, September 2004 version, Chapter 7 (Environmental Assessment), p. 204.

²⁴⁰ The scope and scale of the proposed TBOD is described in Chapter 2.

²⁴¹ DMP, Chapter 7.

²⁴² DMP, Chapter 7, p. 214.

*considered as Category A for each basin to be carried out when the work in each basin is planned to be executed by the concerned provincial authorities.*²⁴³

321. **The Panel remains concerned, nevertheless, about the process through which the DMP was elaborated. The far-reaching impacts to be expected, the Bank’s assignment of Category “A” for each basin, and the large budget proposed for implementing the DMP, should have triggered a Category “A” designation for the DMP.** The Panel notes, in this regard, that OD 4.01 envisions different types of EAs, including sectoral and regional EAs, depending on the nature of the proposed action.²⁴⁴ These types of EAs provide the opportunity for the type of strategic and integrated analysis needed for multi-faceted proposals and programs such as the DMP, in consultation with potentially affected stakeholders, at the crucial stage of program design and identification of proposed actions and budgets.²⁴⁵
322. The Panel also reviewed, more generally, the process for assessing other sub-projects or components of the NDP Project. The Panel identified a number of issues and difficulties, especially in relation to the problems of capacity and expertise within the relevant agencies.²⁴⁶

9. Environmental Advisory Panels

323. OD 4.01 provides that for *“major, highly risky, or contentious projects with serious and multidimensional environmental concerns,”* the borrower should normally engage an environmental advisory panels (EAP) of independent, internationally recognized environmental specialists. The EAP provides advice on terms of reference for the EA, key issues and methods in preparing the EA, recommendations and findings of the EA, and development of environmental management capacity in the implementing agency.
324. The Panel considers that the LBOD and NDP qualify as these types of projects. They are among the biggest infrastructure projects Pakistan has ever known, and relate to the *“largest integrated irrigation system in the world.”* (1997 SAR p 1 para 1.3). In fact, the SAR refers to a *“national crisis.”*
325. In line with OD 4.01, the EAPs need to be in place early to ensure that the terms of reference are adequate for any environmental and social work to be carried out during

²⁴³ Draft DMP, September version, p. 204, paragraph 7.2.2.

²⁴⁴ OD 4.01, ¶s 4 -6.

²⁴⁵ The Panel notes that the Bank has developed a best practice of “Strategic Environmental Assessment”, which initially arose from policy requirements to carry out an EA for investment projects and to use sector or regional assessments in specific contexts. Information on the development and use of SEA is available at <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/>.

²⁴⁶ For example, Project documents single out the RBOD as needing a full EIA, while an assessment was carried out by non-environmental military. The Panel was not able to determine the extent to which any environmental expertise was engaged in this review. The Panel was also informed that EAs are expected to be undertaken by WAPDA’s Environmental Cell and the Provincial EPAs. The Panel’s expert found that WAPDA was not enthusiastic about environmental assessments since the design of LBOD, and had no environmental officers available from which to create an Environmental Cell. Existing non-environmental WAPDA staff were transferred to the new Environmental Cell, but this does not equip the Cell with experienced environmental officers capable of completing and implementing EAs.

feasibility or design, hence well before project appraisal and construction. For the NDP, the EAP should have been in place from around 1994 onwards. This would have ensured social and environmental issues would have been integrated into the Irrigation and Drainage Issues paper of March 25, 1994, or in time to ensure that the June 1993 DSEA was adequate.

326. An appropriate EAP was not put into place, however, until around 2004. The consultant and WAPDA convened many environmentally-related committees before then, but they were almost entirely rearrangements of existing engineers with little or no environmental experience. Occasionally this lack of any environmental expertise was recognized, and the committee invited civil society organizations to contribute.
327. **The Panel considers that the failure to put in place an EAP for the NDP Project until 2004 is not consistent with the intent of OD 4.01.** The Panel notes, however, that Management did take substantial actions to field independent Panels of Experts to provide input on other important technical issues that arose during implementation.

10. The Chotiari Reservoir

328. As noted previously, the Requesters raised concerns about the social and environmental impacts of the Chotiari Reservoir and its embankment. The Chotiari Reservoir was a substantial investment component of the LBOD. It consists of the longest embankment (55 km.) in the world, and is sited on fragile geology. It was mostly completed under the LBOD and then carried into the NDP Project for completion. While the Bank did not fund this component of the NDP Project after the Borrower rejected the resettlement framework (see Chapter 4), it retained an obligation to supervise its resettlement component because it remained part of the overall Project. The Panel is informed that the reservoir has not yet been filled as of May 2006.
329. The Panel has learned that the environmental analysis of the Chotiari Reservoir and embankment has been beset with problems from the outset. The Bank's November 5, 1984, SAR asserts, with no supporting evidence, that "*Chotiari reservoir impoundment would create negligible damage and resettlement costs, since only a few accommodations for fishermen are located in the reservoir inundation area.*"
330. The 1993 outline of an EIA (on The Nara Canal, Chotiari and the Tidal Link) led to a skeleton EMMP for LBOD in 1998, by which time the Nara Canal and the Tidal Link had both basically been completed. The EMMP recommended that a comprehensive EIA be carried out for the Chotiari Reservoir, as well as a Resettlement Action Plan.²⁴⁷
331. As described in more detail in Part D of this Chapter (Natural Habitats), the reservoir inundation area includes a large area of rare, unique and important habitat and wildlife. An appropriate EA for the NDP Project would have properly assessed these impacts before appraisal, when critical decisions regarding the Project were being made. This assessment could have built upon previous analysis to the extent available.

²⁴⁷ EMMP (LBOD), p. 6-3. In the view of the Panel's expert, the Project Implementation Completion Report of LBOD of 1998 downplayed the impacts of the Chotiari Reservoir even though by that time the potentially severe impacts had become known. See also Chapter 4 (Social Compliance).

Additional information on the social impacts of the Chotiari Reservoir and embankment is contained in Chapter 4.

11. Consequences for Project Affected People and the Environment

332. A proper and timely Category “A” Environmental Assessment for the NDP would have provided the necessary opportunity for the Bank to fully analyze risks and issues presented by the Project, and to identify alternative approaches that would minimize adverse impacts and maximize possibilities to restore and improve the environment. It might also have assisted the Project in giving closer attention to the specific impacts upon the environment and non-Project beneficiaries in southern Sindh during both the design and implementation phases of the Project.
333. **The Panel finds that as a result of shortcomings in the Environmental Assessment, decision-making on environmentally-crucial elements under the Project became less systematic, less informed, and more *ad hoc*. As a consequence, the Bank and the Project missed important opportunities to address concerns raised by Requesters, and to consider providing compensation for harms that could not otherwise be mitigated. This did not comply with OD 4.01.**
334. With the collapse of sections of the LBOD system, environmental and social conditions in southern Sindh have worsened. **There is presently the growing prospect of profound and irreversible harms to the biological integrity of the dhands and, by extension, the livelihoods of the people and villages who depend on them** The basic Project environmental documentation, however, fails to provide an adequate basis to assess alternatives to address this situation, reduce impacts, and restore damaged ecological systems and livelihoods. **The failure to carry out an appropriate Category A EA for the newly finalized DMP is of particular concern in this regard.**
335. The Panel notes, at the same time, the significant efforts to support institutional and policy reforms, the attention to environmental issues in implementation, and the use of independent Panels of Experts to review Project documents. **The Panel also commends Management for putting a focus on the urgent need to make progress on environmental management and monitoring plans, and for the recently initiated study of socioeconomic conditions in the coastal areas of Badin and Thatta Districts and related follow-up.** The records suggest, moreover, that investment was scaled-back compared to original plan, at least in part due to changing conditions on the ground and related environmental concerns. **The Panel finds that Management has taken important steps to adjust the NDP project trajectory during implementation to address potential environmental harms**

D. Natural Habitats

336. The Requesters state that the wetlands affected by the Project are an important natural habitat because they are part of a migratory route for waterfowl and nesting grounds for a large number of important bird species, including some endangered species. They note that two species of marine turtles inhabit the area, and that the wetlands,

channels and creeks are a productive fishery with several species of commercially valuable shrimp, prawns and crabs. They state that the dhands provide livelihood resources to the forty villages of fishermen having a 12,000 to 15,000 population living around the se water bodies, and there is no other livelihood source.²⁴⁸

337. The Requesters assert that two of the dhands -- the Nurri Lagoon and the Jubho Lagoon -- are internationally recognized sites under the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, especially “*because of their significance for migratory birds and other biodiversity and ecosystem values.*”²⁴⁹ They state that Pakistan is a Party to the Ramsar Convention, and that the Bank is “*not supposed to provide support to projects that would contravene a government’s requirements under international environmental treaties and agreements.*”²⁵⁰
338. They state that the linking of the KPOD with Shah Samado Creek by the Tidal Link through the dhands was “*entirely unsound*”, and that the Tidal Link prevented the water from the Rann of Kutch during wet years from entering the dhands. They state that the decreasing water flow has reduced the areas of the dhands.²⁵¹ The Requesters claim that the degradation of the wetlands has already caused severe damage to the ecosystem, habitat and fish catch.
339. Management states that OP 4.04 (Natural Habitats) is not applicable to the Project.²⁵² Management believes that the NDP Project is being implemented in a manner that does not add to or exacerbate the environmental problems of the already degraded Indus River Delta or the Coastal Zone, and notes that the LBOD will not be extended under the NDP Project.²⁵³
340. OP 4.04 sets forth provisions intended to ensure that Bank-financed projects support the protection of natural habitats, and do not result in their significant conversion or degradation. Under OP 4.04, a particularly stringent standard of protection applies to “*critical natural habitats.*” Where these are identified, the Bank shall not support projects that involve their significant conversion or degradation. Other natural habitats may be adversely affected only where there are “*no feasible alternatives*” for the project and its siting, and a “*comprehensive analysis*” of the project demonstrates that its overall benefits “*substantially outweigh its environmental costs.*”²⁵⁴

1. Habitat Affected by LBOD and NDP

a. The Dhands

341. The dhands in southern Sindh were not normally connected to the ocean. Typically, they are strongly seasonal, shallow, brackish water lagoons. They supported extensive

²⁴⁸ Request for Inspection, p. 2 and ¶ 39.

²⁴⁹ Request for Inspection, ¶ 40.

²⁵⁰ Request for Inspection, ¶ 40.

²⁵¹ Request for Inspection, ¶ 42.

²⁵² Management Response, ¶ 44.

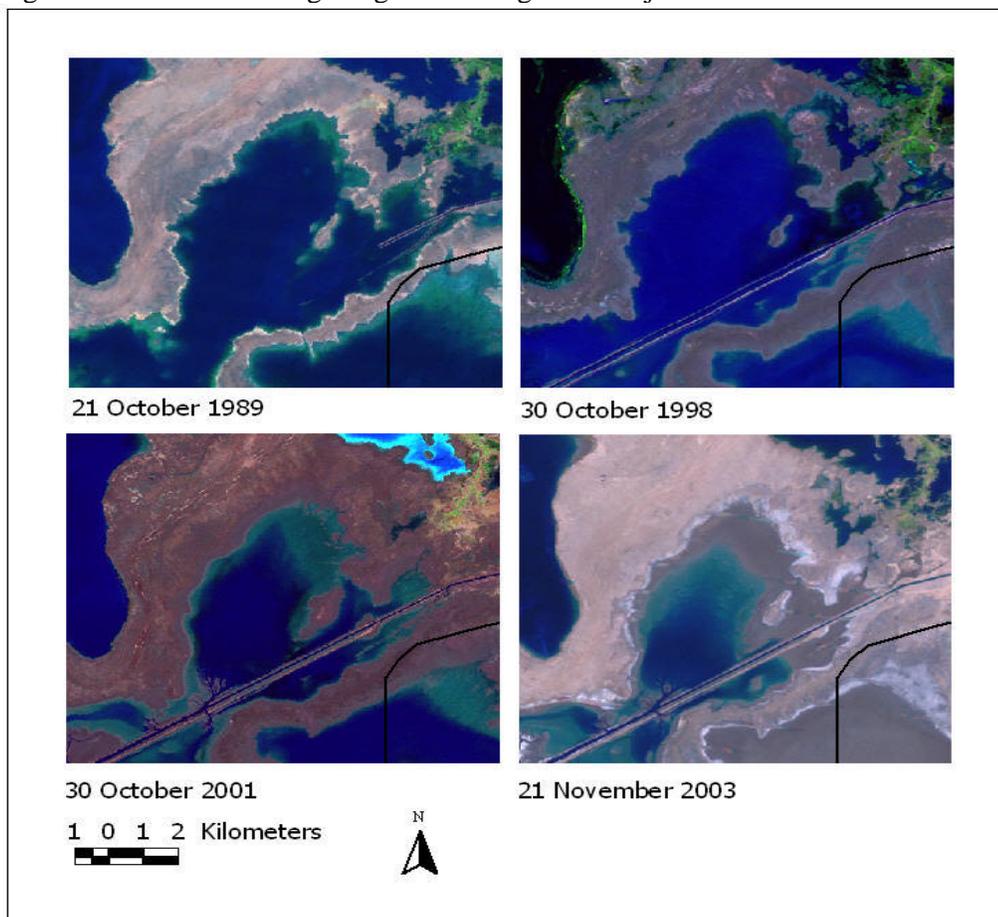
²⁵³ Management Response, Annex 1, Item 9, p. 22.

²⁵⁴ OP 4.04 (Natural Habitats), ¶ 1, 3, 4 and 5.

grazing which was exploited by the local inhabitants. Any brackish water would come from brackish surface run off and rarely from extreme weather events that temporarily linked the dhands with the sea.

342. Thus, biologically the many dhands are biodiversity-rich and productive lakes. In addition, they are situated on international migration routes of many species of birds. Waterfowl in particular arrive by the tens of thousands from the North. Fish and birds in the highly productive water were a mainstay of the livelihoods of the people of Badin and Thatta.
343. Partly in order to conserve these resources, LBOD was designed to include an embankment closely parallel to the drain to prevent the drainage effluent on its way to the ocean from contaminating the dhands at the nearest active tidal link of Shah Samando Creek. The chosen route directly impacted the Pateji and Cholri dhands, and also suffered from being southwest in direction. This meant the prevailing (strong) monsoon winds, tides and wave action would tend to back the effluent up the drain, this increasing the risk of spillage of effluent upstream. This is what happened soon after LBOD was built.
344. When the Cholri Weir collapsed in May 1999, the Pateji and Cholri dhands became tidal sea water inlets. Sea water and tidal influence now extend far up the tidal link, and into the dhands. Sea water now reaches the point where the KPOD connects to the Tidal Link (RD zero point). In addition, now that LBOD has subjected the dhands to tidal influence, the risk of flooding has increased.

Figure 10: Remote Sensing Images of Changes at Pateji Dhand



Source: Landsat (Geostat) (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link; black line is border between Pakistan and India)

345. As described above, this situation is taking a high environmental toll. Rising salinity in the dhands, in particular, is compromising their biological integrity: birds and waterfowl are suffering; distinctive vegetation is being lost; and there has been a major decrease in yields and species composition of the fishery.
346. It is difficult to judge the extent of negative impacts resulting from the NDP as distinct from the LBOD. In this regard, the Panel notes that the NDP Project supported substantial actions to complete the LBOD system. The Panel also notes that the Bank had a responsibility under the Project to address problems in the LBOD that arose. As described in other sections of this Report, however, **the Project focused on ensuring the evacuation of LBOD effluents, and paid little attention to impacts on, or means to rehabilitate, the dhands as a habitat and ecosystem. This was not consistent with OP 4.04.** The recommendation to establish a scientific group comprising multidisciplinary specialists to monitor the situation following the failure of the weir, made by the March 2001 Bank Fact Finding Mission in 2001, was not implemented. In addition, as noted above, there were significant shortcomings in the development and implementation of environmental management and mitigation measures under the Project.

b. The Ramsar Convention and Ramsar Sites

347. The Ramsar Convention on Wetlands of International Importance (the “Ramsar Convention”) was signed in Ramsar, Iran in 1971. It provides an internationally-agreed framework for the “conservation” and “wise use” of wetlands and their flora and fauna through local, regional and national action and international cooperation.²⁵⁵ The Ramsar Convention highlights the “*fundamental ecological functions of wetlands*”, and notes the conviction of Parties that wetlands “*constitute a great economic, cultural, scientific and recreational value, the loss of which would be irreparable.*”²⁵⁶
348. Under the Ramsar Convention, each Contracting Party shall designate suitable wetlands within its territory for including in a “*List of Wetlands of International Importance*” (the “Ramsar List”).²⁵⁷ Wetlands are to be selected for the Ramsar List on account of their “*international significance*” in terms of ecology, botany, zoology, limnology or hydrology. In the first instance, “*wetlands of international importance to waterfowl in any season should be included.*”²⁵⁸ Among its many other provisions, the Ramsar Convention provides that Contracting Parties “*shall formulate and implement their planning so as to promote the conservation of wetlands included in the List (...).*”²⁵⁹ Pakistan became a Party on November 23, 1976.
349. According to the Ramsar Convention, Pakistan has 19 Ramsar sites. Ten of these are in the Sindh Province. These are Haleji Lake, Indus Delta, Indus Dolphin Reserve, Nurri Lagoon, Jubho Lagoon (Sanhro Dhand), Kinjhar (Kalri) Lake, and Rann of Kutch. Box 3, below, describes three sites considered during the Panel’s investigation:

²⁵⁵ Ramsar Convention, Article 3; Mission Statement developed at Eighth Conference of the Parties (COP 8) of the Convention in 2002.

²⁵⁶ Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, Iran, 2.2.1971, as amended by the Protocol of 3.12.1982 and the Amendments of 28.5.1987, Paris, 13 July, 1994.

²⁵⁷ Ramsar Convention on Wetlands, Article 2.1.

²⁵⁸ Ramsar Convention on Wetlands, Article 2.2.

²⁵⁹ Ramsar Convention on Wetlands, Article 3.1.

Box 3: Ramsar Convention Sites in the Affected Area²⁶⁰

Jubho Lagoon (Sanhro Dhand). Pakistan included the Jubho Lagoon on the Ramsar List on May 10, 2001. It is a 706 hectare wetland in Jati, Thatta District. It consists of brackish mudflats and inland lagoons, impacted by the tidal link. It is a site of some 60,000-100,000 migratory waterfowl annually, including pelicans and flamingoes, including the very rare Dalmatian Pelican. It is connected to Cholri, Pateji, and Nurri wetlands. The site is privately owned by local inhabitants, who practice fishing and livestock grazing. WWF launched a wetland visitors' centre on World Wetlands Day 1999.

Nurri Lagoon (Mehro Dhand). Pakistan also included the Nurri Lagoon on the Ramsar List on May 10, 2001. It covers 2540 hectares in four interconnected shallow wetlands, and is seasonally connected to Jubho, Pateji, and Cholri wetlands. All now drain into the tidal link. It normally is brackish and inland lagoons and mud flats, seasonal, and is a site for many migratory birds. It also supports 3000-4000 people (mainly fishing and hunting). Both the Jubho and Nurri Lagoons have been recognized as highly significant for Pakistan's conservation long before the LBOD and NDP.

The Rann of Kutch. Pakistan included the Rann of Kutch on the Ramsar List on November 5, 2002. It is a 566,375 hectare Wildlife Sanctuary and part of the great Thar desert. It comprises stabilized sand dunes, some more than 170m in height, with broad inter-dunal valleys of alluvial soil, integral with the large Rann of Kutch across the frontier with India, which includes permanent saline marshes, coastal brackish lagoons, tidal mudflats, and estuarine habitats. The site supports many locally and globally threatened species, including the Great Indian bustard (*Choriotis nigriceps*), Houbara bustard (*Chlamydotis undulata*), Sarus crane (*Grus antigone*), and hyena (*Hyeana hyaena*) and supports more than 1% of the biogeographical population of flamingos *Phoenicopterus ruber* and *P. minor*. Some 500,000 agro-pastoralists live in 330 villages/hamlets in the site area, and rich archaeological remains include three giant temples dating from 1375-1449. Scarcity of water remains the potential threat to the ecosystem. WWF-Pakistan and Sindh authorities have carried out work with GEF funding and a management plan is in preparation.

350. Data in Table 3 show a substantial decline in the number of birds at the Sanhro Dhand (Jubho Lagoon).²⁶¹ Little or no trend is indicated for the Nurri Lagoon, but the total combined number of birds in the two adjacent and inter-connected lagoons shows a substantial decline of about 46% between 1990 and 2002.

Table 3: Number of Birds Recorded in the Two Lagoons from 1990 to 2002

Year	Jubho Lagoon	Nurri Lagoon
1990	68,548	71,335
2001	24,448	43,115
2002	13,712	50,997

Source: As recorded by the Sindh Wildlife Department (SWD) in their annual census²⁶²

351. Other major adverse ecological effects on flora and fauna in the dhands, associated with rising salinity and changed water flow, also are noted. The Pateji Dhand, which is noted under the Ramsar Convention as being "inter-connected" with the Jubho Lagoon and other dhands, has suffered greatly.
352. Figure 11 shows the Mehro, Sanhro, and Cholridhands. These show a decrease in size since 1989.²⁶³ Most striking about this time series is the water supply and drainage to the systems. The only connection to the dhands is now a small network of creeks, whilst before construction of the structure an open lake system with the Rann of

²⁶⁰ The Annotated Ramsar List can be found at <http://www.ramsar.org> .

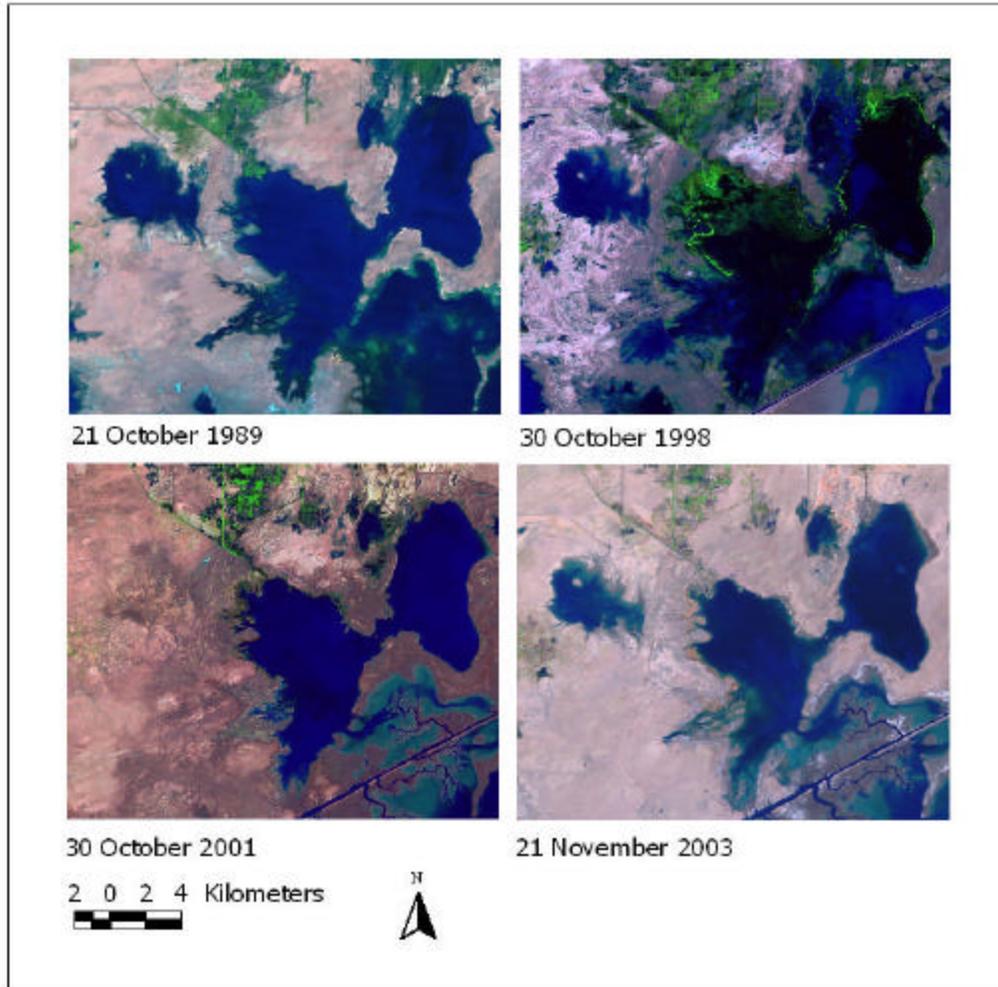
²⁶¹ The Annotated Ramsar List.

²⁶² Shahid Amjad and Samina Kidwai, Freshwater, brackish water and coastal wetlands of Sindh: Status Paper, Karachi, NIO, as shown in the DMP Panel Consultation, Annex 2.

²⁶³ Additional information on the dhands over time is provided in Chapter 2.

Kutch existed. During floods and high tides salt seawater can enter the dhands now, but the poor drainage conditions under normal circumstances form a serious impediment to drain the water out of the system. This might well result in an increasing salinization of the dhands as confirmed by measurements.

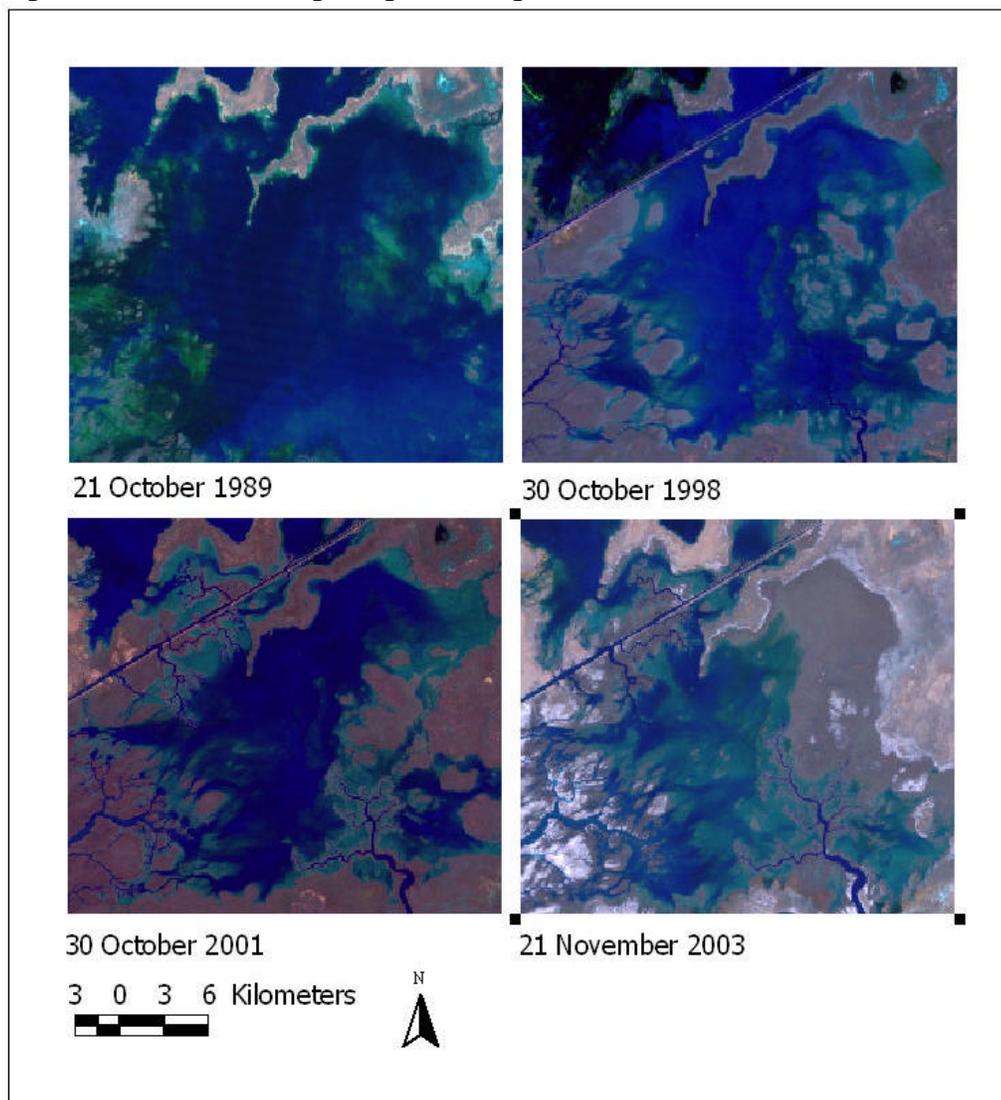
Figure 11 : Remote Sensing Images of Changes at Mehro, Sanhro and Cholri Dhands



Source: Landsat (Geostat) (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link)

353. Figure 12 shows an overview of the Rann of Kutch. It appears that the water level in October has decreased over the years, although it requires some interpretation to relate this to the tidal link and its destruction. During the initial period (compare images of 1989 and 1998), the Rann of Kutch was separated from the dhand system through construction of the Tidal Link. This interrupted the flow of fresh or brackish water from the dhands into the Rann and led to a lowering of the water level and higher salinity. Subsequently (see images of 2001 and 2003), the Rann of Kutch has been reconnected through a network of creeks and the breached tidal link. It is likely that this new hydrological system has led to much quicker response to sea water levels.

Figure 12: Remote Sensing Image of Changes at Rann of Kutch



Source: Landsat (Geostat) (mud plains in white; intensity of blue correlates with water depth; straight diagonal line is Tidal Link)

354. **The Panel finds that the negative effects on the dhands amount to a “significant conversion or degradation” within the meaning of OP 4.04.** The Jubho Lagoon and the dhands system more generally in the southern reaches of Sindh Province are under severe threat. The visual data show a decrease in the size of the dhands. According to the Panel expert, the hyper-salinity readings in the Rann of Kutch are “remarkable” and the Pateji Dhand, inter-connected with the Ramsar-listed dhands, is biologically dead.
355. Management asserts that the NDP Project has not supported projects that directly affect the dhands designated under the Ramsar Convention, mentioning the Nurri and Jubho Lagoons, but notes that “[m]ore detailed assessment is required to determine if

*these sites are affected by the breaches in the Tidal Link Canal and the collapse of the Cholri Weir.*²⁶⁴

356. **Although it is difficult to separate impacts of the LBOD system from those of investments financed under the NDP Project, the evidence indicates that the two, in combination, have contributed to significant adverse impacts on these internationally recognized sites.** It is worth highlighting again, in this regard, that the NDP Project worked to complete the LBOD system, and failed to take adequate action in line with Bank policies to implement actions to reverse the impacts of the LBOD system as they arose.
357. As described previously, the environmental analysis under the Project gave little attention to potential impacts on the dhands ecosystem. **The Panel finds that the Bank did not adequately consider the risks of further degradation of the Jubho Lagoon, a critical natural habitat. This is not consistent with OP 4.04. In light of further work on the LBOD system, and in planning for the implementation of the DMP, it will be crucial for Management to be aware that other critical natural habitats in the region are under a similar threat, including the Rann of Kutch and the Nurri Lagoon.** These Ramsar-listed sites are the type of critical natural habitat that Bank policy promises not to significantly convert or degrade.

c. Chotiari Reservoir

358. The Panel's expert determined that the Chotiari Reservoir will be some 100 square miles.²⁶⁵ In addition to its impacts on villages and people (see Chapter 4), it will affect grazing lands in Sindh, economically important fisheries and important areas of habitat and designated natural reserves. The first reserve is the major Game Reserve of Belat established in 1945 to conserve the rare Thompson's Gazelle and much other endangered wildlife. The second is a Wildlife Sanctuary at Oudh, which also will be partly inundated.
359. The LBOD EMMP contains additional information on the affected habitat. It states that the greatest part of the area to be flooded consists of wetlands habitat containing aquatic plants that *provide enormous food reserves for invertebrates which in turn sustain the birdlife, fish and mammals.*²⁶⁶ The area also includes lakes *"which comprise a valuable fishery for numerous communities as well as being an outstanding habitat for wildlife,"* and a semi-marsh reed bed reported to be home to a variety of wildlife, including the endangered hog deer and other rare and protected species such as the marsh crocodile, the Indian smooth coated otter and the marbled teal (which breed in the area).²⁶⁷
360. With respect to the impacts of the reservoir on this habitat and wildlife, the LBOD EMMP states, *inter alia*, as follows:

²⁶⁴ Management Response, Annex 1, Item 16, p. 26.

²⁶⁵ As noted previously, Management indicated that as of May 2006 the reservoir has not filled.

²⁶⁶ EMMP (LBOD) pp. 3-18.

²⁶⁷ EMMP (LBOD), pp. 3-19; see also pp. 4-8.

*“While the other animals may not be affected to any significance by the reservoir, the Hog deer will be endangered because there is no sizeable habitat available in the near vicinity where these animals could take refuge. It is thus important that the area be surveyed and an appropriate mitigatory plan be prepared.”*²⁶⁸

361. The EMMP considers that other *‘birds and small mammals should not be seriously affected because of the many other areas of similar habitat in the vicinity and there are routes along which they can move (...). Wildfowl and crocodile should benefit from the increased body of water, but hog deer will move (or be moved) to similar habitat elsewhere. Appropriate locations are now being investigated, and plans and procedures can be drawn up in 1998.’*²⁶⁹
362. With respect to aquatic plant life, the EMMP states that the reservoir is *“likely to kill much of the phragmites reed beds which cover the majority of the existing wetland as well as the grass and trees of the dry land. However, a gradual increase, over three to four years, in maximum retention level will help to propagate vegetation along the new margin, and spread the effects of decaying vegetation within the reservoir.”*²⁷⁰
363. This analysis relies on certain assumptions regarding the adaptation process to the flooding. These include that wildlife in the inundated area (other than the hog deer) will be able to move to other similar habitat in nearby areas, or adapt to the reservoir waters, and that vegetation will be able to propagate on the new margins of the reservoir.
364. The Panel’s expert observed that the potential impacts of the inundation on the affected habitat could be devastating. The expert found that Project environmental documents seem to have overlooked the designated nature reserves. He also found that IUCN’s recommendation to create a Wildlife Sanctuary for the wildlife displaced and the two sanctuaries inundated by the reservoir was not implemented. As the resettlement sites for the villages to be displaced by the reservoir have not been finalized, their impact on displaced wildlife cannot be assessed. As the reservoir is a seasonal storage reservoir, it may be emptied when water demand is highest in winter. Wildlife will be affected by seasonal drawdowns. It should also be noted that the EMMP, while identifying various potential impacts, leaves mitigation actions as follow-up.²⁷¹ This is of much concern because, as acknowledged by Management, there has been a failure to implement the EMMP.
365. As noted previously, the Bank withdrew from funding the Chotiari component following the Borrower’s rejection of the FLAR, and the component was financed by other sources as part of the overall NDP Project. The Bank retained an obligation to supervise its resettlement component because it remained part of the overall Project. Taking into account Management’s changing role, and the potentially profound impacts on important and even possibly critical natural habitat in the area affected by the reservoir, **the Panel notes Management’s continuing responsibility to supervise this activity and its effects on these sensitive areas of natural habitat.**

²⁶⁸ EMMP (LBOD), pp. 3-19.

²⁶⁹ EMMP (LBOD), pp. 4-8.

²⁷⁰ EMMP (LBOD), pp. 4-8.

²⁷¹ See EMMP (LBOD) pp.3-19 (for the hog deer, “an appropriate mitigatory plan would be prepared”).

2. Rehabilitation of Degraded Natural Habitat

366. The irrigation and drainage mechanisms in the Basin reflect an extraordinary level of investment and effort to make water available for the benefit of agriculture. In light of OD 4.04, it is important to ask to what extent efforts have been made to rehabilitate habitats that have been harmed by these efforts.
367. The Panel notes, in this regard, that WAPDA's budget of Rs.619 million for "Environmental Rehabilitation Package for the Tidal Link" commendably includes 'Mangroves at RD 154'. This was, however, not implemented. The Panel's expert notes that mangroves, as well as brackish sedges and grasses (e.g., *Oryza*), stabilize mud and silt and attenuate tidal action at low cost while attracting aquatic resources useful for the local people.
368. In line with OD 4.04, the Project's balance between irrigation and drainage interventions, on the one hand, and measures to protect and restore the environment and natural habitat on the other hand needs to be re-considered. Low-cost measures, such as biological re-vegetation, exist. The Panel's expert found, however, that biological components have been absent.
369. Paragraph 3 of OD 4.04 states that the Bank "*promotes rehabilitation of degraded natural habitats.*" As discussed above, **the NDP Project in combination with the inter-related LBOD system have produced significant negative effects on natural habitats, including the dhands. The Panel finds that the Bank did not meet provisions of OP 4.04 to take action not only to conserve, but also rehabilitate, these habitats.**

E. Conclusions

370. The specifics of World Bank compliance with its own policies are described above. Management has acknowledged its basic error of classifying NDP as a less important "B" environmental category. However, throughout design, construction and operation of LBOD and NDP, social and environmental aspects were largely overlooked or downplayed. In particular, the Panel found that the Project paid inadequate attention to the people and environment downstream of the irrigation and drainage system in southern Sindh.
371. The Panel found that serious harms have befallen the ecological systems in southern Sindh region as a result of the LBOD and NDP taken together, and incidents of non-compliance with Bank policies. In many cases, these harms are becoming increasingly difficult to reverse. The Panel found that environmental management and mitigation measures were not adequately developed and implemented, and -- perhaps as a result of this situation -- consideration was not given to compensatory measures for impacts that could not otherwise be mitigated.
372. The Bank has, at the same time, taken a number of positive actions, in coordination with the Borrower, to solicit views from independent experts and has re-directed several actions under the NDP Project. The Bank has also promoted important policy and institutional reforms. These efforts are to be commended. The Panel hopes that

progress in this regard will be maintained and enhanced, in line with Bank policies, the concerns raised by the Requesters, and the issues raised in this Report.

Chapter 4: Social Compliance

A. Introduction

373. For centuries, irrigation in the Indus Valley was small-scale and localized, some of it perhaps existed as early as during the Harappan civilizations of the 3rd millennium B.C.²⁷² Large-scale extensive irrigation systems were developed under the Mughals and their tributary states (such as the Kalhora and later the Talpur dynasties in the Sindh) in the 18th and early 19th centuries.²⁷³ The British Raj built upon the irrigation networks of the Mughals to create the extensive canal irrigation of the Jumna, Ganges, and Indus river valleys during the late 19th and early 20th centuries.²⁷⁴
374. The Indus Valley contains the largest contiguous irrigation network in the world. This has led to the opening of vast areas of new farmland in the Punjab and Sindh. Punjab soon became the “granary” of India, providing much of the wheat that is the staple of the north Indian diet.²⁷⁵ The World Bank has been the principal donor supporting the development of irrigation and drainage in Pakistan during the nearly six decades since independence.²⁷⁶
375. The Requesters claim that the local communities have suffered heavily in the cyclone of 1999 and monsoon rains of 2003, and that in both events the Tidal Link and KPOD “inundated their villages, damaged houses and some families even lost their family members.”²⁷⁷ They claim that their traditional fishing grounds have been damaged by the LBOD and the intrusion of sea water into the dhands and inland waterways, and that agriculture and grazing in the area also has been damaged. They add that the cyclone of 1999 and the flood of 2003 have forced people to leave the area because of loss of livelihood and other environmental problems attributed to the LBOD and Tidal Link and loss of lands acquired to expand existing canals and to build new canals.
376. The Requesters claim that given recent experience with major floods and the further extension of the LBOD structures under the NDP, they expect more flooding in the future, which will have tragic consequences for them and their way of life. They add that there are several thousand people who entirely depend on local dhands for fishing and on grazing and agriculture for their livelihood who will be forced to leave their ancestral villages by saline water flooding their area.²⁷⁸ Management responds to this claim by saying that areas of lower Sindh are indeed prone to flooding, but that flooding was greater before construction of the LBOD Stage 1 Project.²⁷⁹ Management believes that “*the implementation of the NDP project has not and will not exacerbate flooding.*”²⁸⁰ It emphasizes that a PoE rejected the drainage superhighway concept, so

²⁷² Basham, 1954 (1959 Edition), p. 18

²⁷³ Lambrick, 1986, pp. 193-194.

²⁷⁴ Lambrick, 1986, pp. 193-194 and Stephen Philip Cohen, *The Idea of Pakistan*, 2005, Lahore: Vanguard Books, p. 21

²⁷⁵ Spear, 1961.

²⁷⁶ SAR (NDP), p. 9

²⁷⁷ Request for Inspection, ¶ 50.

²⁷⁸ Request for Inspection, ¶ 19.

²⁷⁹ Management Response, Annex 1, Item 12, p.24.

²⁸⁰ Management Response, Annex 1, Item 12, p. 24.

the type of flooding the Requesters fear “*will not occur as a result of disposal of drainage effluents in the lowland areas of Sindh.*”²⁸¹

377. The Requesters also express fear that the expansion of the KPOD, the DPOD, and the Spinal Drain will drain several thousand acres causing them to lose their remaining land.²⁸² Management responds by repeating its statement that the Bank has no plans to support the expansion of the KPOD, DPOD, or the Spinal Drain. The only works planned for the KPOD and financed by the Bank are repairs.²⁸³ Management states that “*IDA funding has not supported any subprojects that require land acquisition or resettlement*”²⁸⁴ because of lack of agreement on the FLAR with the GoP.
378. The Requesters claim that the FLAR is vague, does not mention location or quantity of land to be acquired, nor a time frame for compensation payments.²⁸⁵ They also complain of the lack of a RAP, or any consultants engaged to prepare a RAP. Management responds that the FLAR was prepared in 1996, approved by the GoP, and agreed with IDA. Management adds, however, that because no subprojects requiring land acquisition or resettlement were to be included in any IDA-funded investment subprojects, the Bank did not pursue further discussions with the GoP on the FLAR.²⁸⁶

B. Social Impacts and Contribution of the Drainage System

1. Recent Disasters

379. The cyclone of 1999 and the flood of 2003 had profound effects on people’s lives and livelihoods. People in the area are visibly traumatized by the repeated flood events and relate it to the outfall system. The Panel heard vivid accounts of the human suffering and the devastation caused by the flood. A major concern is that these floods could happen again at any time. People feel vulnerable and abandoned because so little has been done in the past years to mitigate the damage and provide better protection.
380. The floods of July/August 2003 inundated large areas of south Badin District. Over 100 people died, livestock drowned, crops destroyed, and fishing grounds devastated. People, especially of children, suffered from water-borne disease and malnutrition. There was also heavy loss of life, homes and property in the Cyclone of 1999.²⁸⁷
381. Although the deltaic region is susceptible to extreme weather, with cyclones, heavy rain, and/or floods occurring every few years,²⁸⁸ people in south Badin claim that

²⁸¹ Management Response, Annex 1, Item 12, p. 24.

²⁸² Request for Inspection, ¶ 20.

²⁸³ Management Response, Annex 1, Item 13, p. 24.

²⁸⁴ Management Response, Annex 1, Item 13, p. 24.

²⁸⁵ Request for Inspection, ¶ 22.

²⁸⁶ Request for Inspection, ¶ 22.

²⁸⁷ See University of Hyderabad, Socio/economic Impact of Cyclone 2a (discussed in more detail below)

²⁸⁸ Oxfam GB, Pakistan Programme, Post Flood Assessment in Badin and Thatta Districts, Sindh, Pakistan, October 2003, p. 3. “Major disastrous events in district Badin and Thatta are recorded as: Cyclone (1964-5), Heavy rainfall (1973), Floods (1976), Floods (1988), Heavy rainfall (1994), Cyclone (1999), Earthquake (2001),

recent events were exceptionally destructive, in part because of the presence of the Left Bank Outflow Drain (LBOD) and Tidal Link Canal. According to local people interviewed in the field, the Tidal Link and LBOD exacerbated flooding in two ways:

- By preventing the natural flow of floodwaters: The direction and structure of the LBOD and Tidal Link Canal passing through southern Badin, with its high embankments, blocks floodwaters from their usual north to south flow into the Rann of Kutch and the ocean. Villagers mentioned that before completion of the Tidal Link, floodwaters receded after one or two days except in the lowest lying areas. After the embankments blocked the natural flow, floodwaters remained high (up to 4 meters) for several days.
- By bringing excessive effluent from districts to the north that are drained by the LBOD, as well as high tide water backing up the Tidal Link from the Arabian Sea: Although farmers in the catchment area were not supposed to release flood waters into the drainage canals immediately after the floods, but instead let the waters recede naturally over 3-5 days, they still did so, with the drainage canals bringing vast quantities of additional water to south Badin.

382. While crops and livestock were lost and some people died in earlier floods, villagers said that none were ever as catastrophic as the two recent events.

2. Agricultural and Grazing Land, and Fisheries

383. As described in Chapter 3 (Environment) the ecological conditions in the areas around the Tidal Link changed dramatically when the weir collapsed and the embankments breached. The dhands became part of the tidal system with daily water level fluctuations and much more saline water. The flooding of 1999 caused long-term damage because of the high salt content of the water and the salt deposited on the land. The increased salinity made vast tracts of agricultural land unproductive.

384. The construction of the Tidal Link and the embankments had cut-off and diverted the surface flow and consequently destroyed the grazing areas. The effect continues because the drain and the remains of the embankments continue to act as effective barriers. The Panel was informed that originally there were seven villages in the area but five had to be abandoned leaving only two with a shrinking population.²⁸⁹

385. The failure of the Tidal Link and the corresponding increase in salinity of the dhands also has had a dramatic impact on the fishing stock in the dhands and the nearby coastal areas. Most fish species disappeared after the 1999 cyclone and only shrimp remain. Economic conditions for many farmers and fishermen have worsened in the coast areas of Badin District, and out-migration has occurred because of lost opportunities for livelihoods. The effects on the livelihoods of the Mallah people in particular are considered in more detail in Section D, below.

Floods (2003).” And Ishrat Hussain, *Economy of Modern Sind* 1981, Jamshoro, Sind: Institute of Sindhology, p. 204, points out an earlier major flood in 1958, but that “*the flood of 1973 broke all previous records.*”

²⁸⁹ Panel interviews with local people.

C. Indigenous Peoples

386. The Requesters claim that most of the coastal communities are Mallah, indigenous people with close attachment to ancestral territories and that there are 60 Mallah villages of 25,000 people who fish in the local waters and in the sea, some close to the KPOD and Tidal Link.²⁹⁰ The Requesters consider that the possible impacts on these people of the KPOD and Tidal Link and of the NDP were never assessed,²⁹¹ and that the cyclone of 1999 and monsoon rains in 2003 ruined their economic base, with faulty operation of the LBOD and breaches in the KPOD being major contributing factors to these disasters. The Requesters state that “[a]lready poor, these communities were pushed into further absolute poverty.”²⁹² The Requesters add that the livelihood base of the Mallah eroded drastically after construction of the LBOD and Tidal Link. The area of the dhands shrunk, and the amount and types of fish and other aquatic life declined. They state that “[t]his gradual decrease in livelihood resources affected overall health and well being of Mallah community.”²⁹³



Picture 4: Panel Meeting with Local Community in a Mallah Village

387. Management, in its Response, considered that “[a]ccording to the PSR (...) OD 4.20 (*Indigenous Peoples*) [was] *not applicable*.”²⁹⁴ Management considered that being Mallah was associated with an occupational group, not an ethnic one, and that the GoP did ‘*not have a classification for Indigenous Peoples*.’²⁹⁵ Management adds that the Mallah community is not considered indigenous because it does not meet the criteria specified in the Bank’s OD 4.20. They (a) do not having an indigenous language distinct from the mainstream language of the region; (b) lack customary social and political institutions; and (c) are not identified by others as a distinct cultural group.²⁹⁶

²⁹⁰ Request for Inspection, ¶ 49.

²⁹¹ Request for Inspection, ¶ 52.

²⁹² Request for Inspection, ¶ 50.

²⁹³ Request for Inspection, ¶ 51.

²⁹⁴ Management Response, ¶ 44.

²⁹⁵ Management Response, Annex 1, Item 20, p. 28.

²⁹⁶ Management Response, Annex 1, Item 20, p. 28.

388. Management considers that the lives and livelihoods of the Mallah fishing community were not disrupted in 1999 and 2003 by the LBOD and Tidal Link, but instead *“the flooding that occurred during these extreme events would likely have been worse had the LBOD and the Tidal Link not been in place.”* Management concedes though that *“no studies have been undertaken to date to determine impacts on this community that might stem from the changed water regime of the dhands.”*²⁹⁷
389. Management also considers that the NDP project was implemented *“under diligent procedures for social and environmental assessment and screening for each subproject,”*²⁹⁸ and that *“[t]here are no ‘proposed NDP investments’ that extend the LBOD, materially change conditions in the KPOD or Tidal Link areas, or other wise threaten people’s lives or livelihoods.”*²⁹⁹
390. Management further considers that all socially and economically vulnerable groups were considered at the subproject level: *“low income groups (small farmers) women and the lowest one third in the income range (including landless and tenants),”*³⁰⁰ adding that since most subprojects *“consisted of rehabilitation and improvement of existing infrastructure, detailed social assessment was not considered necessary,”*³⁰¹ however, *“[f]urther, environmental and social screening of NDP subprojects did not identify any adverse impacts on the Mallah community.”*³⁰²

1. National and Regional Context of Ethnicity and Indigenous People

391. The status of the *Mallah* and of many other groups in Pakistan is clouded by national Pakistani ideology and regional Sindhi nationalism. These issues ought to be discussed first, to understand the context of the Requesters’ claims about the *Mallah*, the Management Response, and some comments about the *Mallah* in discussions and interviews during the field visit.

- National Ideology and Ethnic Minorities / Indigenous People

392. The issue of ethnic minorities in Pakistan is complex. The creation of Pakistan as an Islamic state separate from India has contributed to the national ideology toward ethnic groups and indigenous people in two other very significant ways. First, Islam was considered the great unifying characteristic of the country, overriding any ethnic, cultural, or linguistic differences among its Islamic citizens:

In the zeal and enthusiasm for an independent sovereign state based on Islam, all the ethnic, racial, linguistic and cultural differences were waived aside as insignificant. As a result there was an almost total disregard for the existence of the various ethnic and linguistic groups that were to form post-independence Pakistan. This oversight is clearly reflected in the constitutional

²⁹⁷ Management Response, Annex 1, Item 20, p. 28.

²⁹⁸ Management Response, Annex 1, Item 21, p. 29.

²⁹⁹ Management Response, Annex 1, Item 21, p. 29.

³⁰⁰ Management Response, Annex 1, Item 21, p. 29.

³⁰¹ Management Response, Annex 1, Item 21, p. 29.

³⁰² Management Response, Annex 1, Item 21, p. 29.

*documents of Pakistan where only religious minorities are accorded recognition.*³⁰³

393. To further differentiate itself from India, the national ideology of Pakistan stresses the egalitarianism of Islam as opposed to the hierarchy of the Hindu caste system. Hence, caste is not recognized legally in Pakistan.³⁰⁴
394. At the same time, the state of Pakistan in its 1973 Constitution does recognize major ethnic, linguistic, and cultural differences on the basis of territory, with the creation of a federated government in which each province is identified with a major ethnic, linguistic, and cultural group.³⁰⁵ When people in Pakistan speak of ethnic identity, they often refer to Punjabis, Sindhis, Baluchis, and Pukhtuns – the major peoples respectively of Punjab, Sindh, Baluchistan and the North West Frontier Province – and the Muhajir, migrants from the 1947 Partition of India and their descendents. In the Sindh, the Muhajir are mostly Urdu-speakers and Gujaratis.
395. This association of major ethnic groups with territory is implicit in the legal system. Laws are promulgated at two levels: federal laws that apply to the entire country, and provincial laws applicable to the specific province. *‘Legislation has therefore been made on the basis of geographical units rather than peoples or ethnic groups residing within those regions.’*³⁰⁶ Smaller groups within the provinces are not recognized as distinct ethnic minorities, unless they are also religious minorities.³⁰⁷
396. The approach to ethnic minorities in Pakistan can thus be summarized as:
- 1) In an Islamic state, where all are equal under Islam, ethnic, cultural, and linguistic differences are not considered significant;
 - 2) Given the reality of a multi-ethnic, multi-cultural, multi-linguistic society, major ethno-linguistic differences are recognized through the creation of provinces associated with the major ethnic and linguistic groups; and,
 - 3) There continues to be considerable reluctance to accept the existence of other smaller ethnic groups or more dispersed groups within the larger provincial territories, except for the Urdu-speaking Muhajir and religious minorities.

2. Assessment of Compliance with Bank Policies

397. **Tribal People in Bank-Financed Projects (OMS 2.34).** The policy on Tribal People in Bank-Financed Projects was operative when the LBOD Project was prepared. The policy was intended for *“tribal groups that are relatively isolated and less acculturated. It is not concerned with projects designed specifically for tribal people as the direct beneficiaries, but rather with other types of projects that impact on tribal*

³⁰³ Shaheen Sardar Ali and Javaid Rehman, *Indigenous Peoples and Ethnic Minorities of Pakistan: Constitutional and Legal Perspectives*, 2001, Nordic Institute of Asian Studies, Monograph Series, No. 84. Richmond, Surrey: Curzon Press, p. 1. It is also important to note that paragraph 4 of OD 4.20 states that *“Within their national constitutions, statutes, and relevant legislation, many of the Bank’s borrower countries include specific definitional clauses and legal frameworks that provide a preliminary basis for identifying indigenous peoples.”*

³⁰⁴ Cohen, 2005, p. 35.

³⁰⁵ Sardar and Rehman, 2001, p. 20; see also Cohen, 2005, p. 201.

³⁰⁶ Sardar and Rehman, 2001, p. 2.

³⁰⁷ Sardar and Rehman, 2001, p. 20.

people.”³⁰⁸ Tribal people for the purposes of this policy are defined as “*ethnic groups typically with stable, low-energy, sustained-yield economic systems, as exemplified by hunter-gatherers, shifting or semi-permanent farmers, herders, or fishermen.*”³⁰⁹ Characteristics provided to help determine if a group meets the criteria of a tribal people were:

- (a) *geographically isolated or semi-isolated;*
- (b) *unacculturated or only partially acculturated into the societal norms of the dominant society;*
- (c) *nonmonetized, or only partially monetized; production largely for subsistence, and independent of the national economic system;*
- (d) *ethnically distinct from the national society;*
- (e) *nonliterate and without a written language;*
- (f) *linguistically distinct from the wider society;*
- (g) *identifying closely with one particular territory;*
- (h) *having an economic lifestyle largely dependent on the specific natural environment;*
- (i) *possessing indigenous leadership, but little or no national representation, and few, if any, political rights as individuals or collectively, partly because they do not participate in the political process; and*
- (j) *having loose tenure over their traditional lands, which for the most part is not accepted by the dominant society nor accommodated by its courts, and having weak enforcement capabilities against encroachers, even when tribal areas have been delineated.*³¹⁰

398. It was not necessary that a group possess all the characteristics to be classified as tribal. It is clear though, that this policy focused on groups ethnically, culturally, socially, economically, and also often linguistically very distinct from the more dominant and sometimes antagonist societies around them.

399. **Indigenous Peoples Policy (OD 4.20).** The Indigenous Peoples Policy (OD 4.20) replaced the policy on Tribal People in Bank-Financed Projects in September 1991, and was applicable when the NDP project was prepared. The intent of the Indigenous Peoples Policy is to support ethnic minorities “*with a social and cultural identity distinct from the dominant society*” who might be overlooked during the design of a development project. It is a mechanism either to “*ensure that indigenous people benefit from development projects*” or to “*avoid or mitigate potentially adverse effects on indigenous people cause by Bank-assisted activities.*”³¹¹ The new directive broadened the scope of Bank policy from “*tribal groups*” to include “*indigenous peoples,*” “*indigenous ethnic minorities,*” and “*scheduled tribes.*” The criteria listed by the policy to identify indigenous people are:

- (b) *a close attachment to ancestral territories and to the natural resources in these areas;*

³⁰⁸ OMS 2.34 (Environmental Aspects of Bank Work), May 1984, p. 1, at note 2.

³⁰⁹ OMS 2.34, p. 1.

³¹⁰ OMS 2.34, p. 1.

³¹¹ OD 4.20, ¶ 3.

- (c) *self-identification and identification by others as members of a distinct cultural group;*
- (d) *an indigenous language, often different from the national language;*
- (e) *presence of customary social and political institutions; and*
- (f) *primarily subsistence-oriented production.*³¹²

400. While these criteria are shared by most vulnerable ethnic minorities, the OD 4.20 does not require all the criteria be met in order for the policy to be triggered. The Policy also considers that a “*preliminary basis for identifying indigenous peoples*” can be extracted from within the “*national constitutions, statutes, and relevant legislation*” of borrowing countries.³¹³
401. In assessing Management’s compliance with Bank policies and procedures, two questions need to be addressed: (i) Should the *Mallah* have been considered as tribal people or indigenous people under World Bank policies, thus triggering OMS 2.34 during the preparation of the LBOD Project and OD 4.20 during the preparation of the NDP Project? (ii) Are there any other groups within the project area that might have triggered the World Bank policy on Indigenous Peoples?
402. The Museum of Ethnology at the Institute of Sindhology, University of Sindh, shows the *Mallah* as one of ethnic groups of the region. They are named here as the *Mir-Bahar* (Arabic for “Lords of the Sea”) and depicted as somewhat distinct in dress. They are described as “[o]ne of the oldest ethnic group [sic] of Sindh. Now residing in all over [sic] Sindh.”³¹⁴
403. Many people interviewed during the field visit described the *Mallah* as an “original” or “ancient” Sindhi group. Some academics – anthropologists and sociologists – refer to this group as *Mallah* or *Mohana* interchangeably. They describe them as physically/racially Dravidian, using an “old” dialect of Sindhi (with some old-fashioned words or phrases). Some also claim that *Mallah/Mohana* are remnants of the original Dravidians of the prehistoric Harappan culture. Others describe the *Mohana* as a unique group who are part of a broader category of *Mallah* or traditional fisherfolk. Most of the *Mohana* live around Manchhar Lake; however, some have migrated to wetlands elsewhere in Sindh including Badin and Thatta (see Box 4 below).³¹⁵

³¹² OD 4.20, ¶ 5.

³¹³ OD 4.20, ¶ 4.

³¹⁴ From the display at the Museum of Ethnology.

³¹⁵ Shujaudin Queshi, “The Last of the Mohanas” originally published in Newsline (issue no. unknown, 1999). Accessed on the internet: <http://www.iucn.org/reuters/1999/articles/winningpakistan.htm>, June 14, 2005.

Box 4: Mohana as Indigenous People of Indus Valley Civilization

The *Mohanas* are best known as a traditional fisherfolk. Those who still follow the traditional practices are now mostly found at Manchhar Lake in north Sindh in the Kirthar Valley. They live in colorfully decorated houseboats and use smaller boats to fish and to travel to shore. In addition to their main livelihood of fishing, they are known for their handicrafts made from reeds and lotus plants. Pollution of Manchhar Lake attributed to drainage and urban effluents, has drastically reduced the fishing stock and aquatic plant life. A number of the *Mohana* migrated from Manchhar Lake to wetlands elsewhere in Sindh, including Badin and Thatta, in search of a better livelihood.³¹⁶ The *Mohana* can also be found along the Indus River, but their livelihood here too is threatened by the reduced flow below the Kotri barrage.³¹⁷

Some anthropologists claim the *Mohana* are descendants of the original Dravidians from the prehistoric Harappan society. The houseboats used by the *Mohana* of Manchhar Lake and the Indus River resemble those depicted in a 5,000 year old pictograph seal from Moenjadarо.³¹⁸ If indeed they are remnants of Moenjadarо culture, it would mean that the *Mohana* have roots in the Indus valley from prehistoric times.³¹⁹

404. On several occasions, when the Panel asked for clarification on the claim that the *Mallah* are indigenous, they were told that the *Mallah* are original Sindhis, and that Sindhis are the indigenous people of Sindh. This claim that the Sindhis are the indigenous people of Sindh was raised on several occasions.

405. There is some substance to the argument: though they are a majority of the population in the province, Sindhis are a minority in the entire country. As the original inhabitants of the Sindh, at least at the time of Pakistan's independence, they can also claim to be indigenous to the area, compared to the Mohajir who migrated after partition or the Punjabis and Balochis who recently moved into the Sindh.³²⁰ In any event, groups like the *Mallah*, considered on the edge of the political and economic system, poor and exploited, with some traditions and characteristics unique to themselves, are still regarded by most to be a part of Sindhi culture and society.

a. OMS 2.34 and the LBOD Project

406. The *Mallah* do appear to be a distinct group, identified by caste, occupation (in the past more than the present), physical characteristics, and slight differences in dress and dialect. Communities of *Mallah* continue to practice a traditional way of life claimed to be centuries – some say thousands of years – old. They are a scheduled caste in India and among the poorest elsewhere in South Asia.

³¹⁶ Shujaudin Qureshi, "The Last of the Mohanas" originally published in Newsline (issue no. unknown, 1999). Accessed on the internet: <http://www.iucn.org/reuters/1999/articles/winningpakistan.htm>, June 14, 2005.

³¹⁷ "Voices from the Sea" originally published in The News on Sunday, June 1, 2003, accessed on the internet: www.jang.com.pk/thenews/jun2003-weekly/nos-01-06-2003/kol.htm#1

³¹⁸ Taswir Husain Hamidi, "Sindh Valley Civilization – New Interpretations" in The Indus River: Biodiversity, Resources, Humankind, eds. Meadows, A., and P.S. Meadows, Oxford University Press, Karachi, 1999, p. 331.

³¹⁹ According to the Panel expert, this theory on who were the inhabitants of Moenjadarо is not yet adequately substantiated. See Basham, 1954 (1959 Edition), pp. 24 – 25 on the ethnographic evidence of the Moenjadarо people and comparisons with Dravidians of South India.

³²⁰ Sardar and Rehman, 2001, p. 3

407. **Even so, the Panel finds that the *Mallah* in Badin are not so distinct or separate—whether culturally, socially, or economically – to be considered a tribal group under the provisions of OMS 2.34 during the preparation of the LBOD project.**

408. While they do have some ethnically distinct characteristics and have an economic lifestyle largely dependent on traditional fishing, they do not fit strongly the other provisions. The *Mallah* are not geographically isolated or semi-isolated. They are fully acculturated in the dominant Sindhi society, and are in fact a traditional caste or group that comprises of Sindhi society. They are well integrated in the national economic system, with their fishing and even their agriculture, with most of their production for sale. Although, the slight differences in their dialect distinguish them from the wider society, they are as literate, or illiterate, as other poor rural Sindhis are. They participate in the provincial and national political process, and in fact, with their leading role in the Fisherfolk Forum they are using the political process of advocacy NGOs and protests to claim their economic and social rights.

b. OD 4.20 and the NDP Project: The *Mallah* and Other Groups

409. As noted above, the OD 4.20 criteria applied during the preparation of the NDP Project. **The Panel notes that the criteria to identify indigenous peoples listed under OD 4.20 are more inclusive than those contained in the earlier OMS 2.34.**

410. **The *Mallah* seem to fit more, but not all, of the criteria of OD 4.20.** They are traditionally fishermen, with claims to traditional fishing grounds. Among other things, the *Mallah* are impoverished and vulnerable. They are traditionally fishermen, with claims to traditional fishing grounds (see criteria (a) and (e)). For at least one generation the *Mallah* in Badin have not practiced subsistence fishing or agriculture, but this is due as much to external circumstances – integration in the market economy and the control over fishing resources by the Rangers³²¹ – as to any choice on the part of the *Mallah* themselves.

411. The *Mallah* identify themselves and are identified by others as a distinct group, on the basis of ethnic and slight linguistic differences (see criteria (b), (c) and (d)). Culturally, socially, and politically, the *Mallah* in Badin, however, are well integrated in the broader rural Sindhi society. While there are some customs and traditions that are unique to the *Mallah*, these are not so distinct as to separate them from the rest of the society, which is a key element of OD 4.20. Though some villages consist entirely of *Mallah*, in other villages they live together with several other castes and groups.

³²¹ The Rangers are a paramilitary force that patrols the Indian border. It was reported to the Panel that they were initially granted fishing rights over some areas near the international border, but steadily expanded their control, until they claimed rights over fisheries in the lakes and water bodies, including the dhands, throughout south Badin. The Rangers auction their fishing rights to large contractors. In some cases, the contractors drove the community fishermen from their traditional fishing grounds. In other cases, the local fishermen were forced to sell only to the contractors. Even though the Sindh Fisheries Act 1980 stipulates that fishermen are obligated to sell only a quarter of their catch to the contractor, the Rangers forced the fishermen to sell their entire catch, and at prices well below the market rates (as little as 10% the market price). Since 2004, the traditional and small fishermen of Badin and Thatta have protested against the loss of their traditional fishing grounds and the possession of those grounds by the Rangers. An NGO established by the fishermen themselves, known as the Fisherfolk Forum, has played a leading role in these protests. Shortly before the Inspection Panel visit, the leader of the Fisherfolk Forum, who was scheduled to meet with the Panel, was jailed by the government.

412. The Panel notes that the *Mohana* of Manchhar Lake who have migrated to Badin and Thatta appear to fit the criteria of OD 4.20 more. The 1993 DSEA also mentions certain nomadic groups, likely referring to the *Kuchi* or the *Cholistani* nomads.³²² The Panel's expert found that it would have been appropriate to assess whether these groups, as well as the *Bhil* and *Kohli*, fit within the criteria of indigenous peoples under OD 4.20. An assessment of the *Bhil* and *Kohli*, sharecroppers and agricultural laborers who would be directly affected by any changes in the distribution of agricultural resources and in agricultural production, would have been appropriate not just as sharecroppers or laborers but also as members of distinct cultural and ethnic groups who are especially vulnerable and poor.
413. **In this context, the Panel finds that Management did not initiate a process to determine whether the NDP Project would affect any group of people which would qualify as indigenous peoples under OD 4.20.** OD 4.20 states that Task managers “*should make use of specialized anthropological and sociological experts throughout the project cycle.*” **The Panel finds that the Bank needed to consult with local anthropological and/or sociological experts to determine whether or not any of the ethnic groups living within or near the Project area would qualify as indigenous peoples under OD 4.20. The failure to do so does not comply with OD 4.20. The Panel notes that at least some of these groups may have required an Indigenous Peoples Development Plan (IPDP) under OD 4.20 during Project preparation. Such a document, or a similar document, could have identified potential Project impacts on these people and set forth measures to mitigate risks and potential harm.**

D. Cultural Property

414. The Requesters claim that Thatta and Badin districts have a rich cultural history. Among the important cultural sites in Badin affected by the irrigation and drainage network are “*the monuments of saint Shaikh Kirhiyo Bhandari, the historical site of Roopa Mari and Thari.*”³²³
415. The Requesters also claim that the KPOD is passing through the former Soomra capital of Roopa Mari, where the tomb of Dodo Soomro, the last ruler of the Soomra dynasty, is located. All the sites were badly flooded twice in five years. The Requesters further claim that any expansion of the drainage or irrigation network will impinge further on remaining cultural sites and monuments, especially since “*neither government nor donors have even bother [sic] to recognize the cultural and historical importance of this area and the threat to those places due to drainage projects.*”³²⁴
416. Management, in its Response, asserts that “[a]ccording to the PSR (...) OPN 11.03 (Cultural Property) [was] not applicable.”³²⁵ Management claims that “[t]here are no plans to expand the KPOD under the NDP project” and that “*Roopa Mari is located*

³²² See 1993 DSEA, pp. 6-20 and 6-23.

³²³ Request for Inspection, ¶ 53.

³²⁴ Request for Inspection, ¶ 54.

³²⁵ Management Response, ¶ 44.

*about 2 to 3 km north of RD 10 of KPOD . . . The tomb is located on relatively higher ground . . . The construction and normal operation of KPOD does not appear to have affected the site, since the high water level in the KPOD design is about 1-2 m below the site. In the 2003 rains, however, the area was flooded.”*³²⁶

417. Management further states that “[t]he monument of Saint Shaikh Kirhiyo Bhandari is located on the eastern edge of Pateji Dhand near the tail of Mirwah Canal. It lies on the outskirts of Roopa Mari about 3 km north of RD 5 of KPOD. This tomb was also rebuilt several times and the present building was built about 20 to 25 years ago. The Pateji Dhandh at this location has receded from the site.” Management adds that the “Tharri site is located 10-15 Km north of KPOD near Sirani Drain,” and that an October 2004 Bank consultants’ visit established that no recent damage was observed. Management further adds that *‘according to available information, the Archaeology Department has not classified these sites to date and no excavations have been undertaken at any of them.’*³²⁷

418. At the time the LBOD Project was designed the World Bank did not yet have a policy on cultural property. OPN 11.03 on the Management of Cultural Property in Bank-Financed Projects was effective in September 1986 and during the design of the NDP Project. Following the United Nations definition of cultural property, which “*includes sites having archeological (prehistoric), paleontological, historical, religious, and unique natural values. (...) The World Bank’s general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination.*”³²⁸

419. The key provision for purposes of this analysis is:

*“3. (...) Before proceeding with a project, however, which prima facie entails the risk of damaging cultural property (e.g., any project that includes large scale excavations, movement of earth, surficial environmental changes or demolition), Bank staff must (1) determine what is known about the cultural property aspects of the proposed project site. The government’s attention should be drawn specifically to that aspect and appropriate agencies, NGOs or university departments should be consulted: (2) If there is any question of cultural property in the area, a brief reconnaissance survey should be undertaken in the field by a specialist.”*³²⁹

1. Description of Sites in the Claim

420. Three sites were mentioned in the claim: the tomb of Shaikh Kirhiyo Bhandari, Roopa Mari and the tomb of Dodo Soomro, and Tharri.

○ *Roopa Mari / Tomb of Dodo Soomro*

421. The tomb of Dodo Soomro at the location of Roopa Mari sits almost solitary in a barren landscape (see Picture 2). A few graves are to one side. The building is square and white, with a large dome painted light green, in the traditional south Asian Islamic

³²⁶ Management Response, Item 22, p. 29.

³²⁷ Management Response, Item 22, p. 29.

³²⁸ OPN 11.03 (Management of Cultural Property in Bank-Financed Projects), September 1986, ¶ 2.

³²⁹ OPN 11.03, ¶ 3.

style for a tomb or mausoleum. In the center of the building is the tomb on a raised marble covered platform. The tomb is covered with an embroidered cloth, and garlands hang on strings around the tomb. One of the doors is decorated in mirror work. A sign on one wall commemorates the completion of the reconstruction of the building in 1998. The sign is dedicated to the “*Great Son of Soil Sultan Dodo Shaheed bin Boongar Soomro.*”³³⁰

422. The Soomra dynasty ruled Sindh as an independent kingdom for nearly 300 years from the mid 11th to the mid 14th centuries. They are believed to be a local tribe who converted from Hinduism to Islam. As early converts in the area, they became close to the ruling Arab dynasties, and after some time were able to assert their independence.³³¹
423. Well known Sindhi ballads describe how the Soomra ruler, Dodo Soomro, defeated the superior armies of the Delhi Sultan Alauddin, who came to support the claim of Dodo’s elder half brother Chanesar to the throne. According to the ballads, Dodo died a martyr. Chanesar came to see the evils of the foreign ruler, and he too is said to have died fighting Alauddin.³³² An annual fair of the Soomro clan is held at the site of the tomb, in honor of the martyrdom of Dodo Soomro.
424. Historical evidence, however, does not support the ballads. There were four Soomra rulers named Dodo, and two named Chanesar, but none of the reigns of any Dodo and Chanesar rulers were successive. None of the Sultan Dodos reigned simultaneously with the Delhi Sultan Alauddin. The ballads of Dodo Soomra were likely born out of similar 15th and 16th century stories from Gujarat and Rajasthan, depicting local heroes who resisted the powerful Delhi rulers. Mixed in the tales is the end of the Soomra dynasty, with the defeat of the last Soomra ruler, Hamir bin Dodo, by the first Samma ruler, Jam Unar. This occurred soon after the death of the Delhi Sultan Muhammad Tughluq, probably from poison, during his invasion of the Sindh in 1351. Regardless of the exact historical evidence, the site is of cultural importance to the population of the region.³³³
425. The site surrounding the Roopa Mari tomb is variously attributed as a former capital of the Soomra, as the site of a palace of Dodo Soomro, as the site of a palace of a Queen Rupha, and as an important trading post and fort of the Soomra.³³⁴ Although the folk ballads may be a blend of several historical events, fiction, and ethnic pride, they do have value, “*in reminding us of a number of ruined cities and sights of Soomra and Samma period.*”³³⁵

³³⁰ From field observations of the site.

³³¹ Ishrat Hussain, *Economy of Modern Sind*, 1981, Jamshoro: Institute of Sindhology, University of Sind, p. 4.

³³² Hussain, 1981, p. 4. See also at <http://www.soomra.org.pk/History/history.html>, accessed on July 23, 2005.

³³³ M.H. Panhwar, *Chronological Dictionary of Sind*, 1983, Jamshoro: Institute of Sindhology, University of Sind, Table between pp. 224 and 225, p. 288; M.H. Panhwar, *Source Material on Sind*, 1977, Jamshoro: Institute of Sindhology, University of Sind, pp. 434-37; and www.soomra.org.pk/History/history.html. It is interesting to note that the Soomra had by then become a protectorate of the Delhi Sultanate, and that the Samma were allied with the Mongols who were then invading the Indian subcontinent.

³³⁴ See at www.soomra.org.pk/History/history.html; Ishrat Hussain, op cit., p.4.

³³⁵ Panhwar, 1977, p. 437.



Picture 5: Roopa Mari Historical Site

426. The tomb of Dodo Soomro is the one visible remnant of this site. When first built, it would likely have been placed in or near an existing community, and one which had some meaning to the deceased – perhaps his capital, a favorite palace, or the site where he died. Even if in the middle of a battlefield, it would have been near enough settlements so people could give tribute to, and care for, the tomb. The tomb, then, can be seen as a marker for a site of potential archeological importance.

○ *Monument to Saint Shaikh Kirhiyo Bhandari*

427. The monument to Saint Shaikh Kirhiyo Bhandari is also a square building with a large white dome in the traditional style of south Asian Islamic tombs. It is located on barren land with no other large structures nearby.

428. During the field visits, the requesters stated that Shaikh Kirhiyo Bhandari is important as a cultural/historical figure to local residents, but did not elaborate. A search of literature did not turn up references to Shaikh Kirhiyo Bhandari. The Panel cannot adequately assess the importance of this site.

○ *Tharri*

429. A review of literature confirms that Tharri was an early capital of the Soomra dynasty. While it is not referred to in the IUCN review of cultural heritage in the Sindh, it would still be another site of potential archeological importance if remains of the past settlements are below ground.³³⁶

2. Review of Literature on Cultural Sites in the Area

430. The Sindh is filled with important cultural and historical sites, among them several World Heritage Sites. Foremost are the prehistoric settlements of the Harappan civilization, most notably the city of Moenjaddaro. The historical monuments of Thatta in south Sindh (the remains of a former capital of Sindh from 1592 to 1739, and the

³³⁶ See at www.soomra.org.pk/History/history.html. See also Panhwar, 1983.

largest necropolis in the world in nearby Makli) are also World Heritage sites.³³⁷ The national government of course lists these as important cultural heritage sites.

431. Many cultural sites in the Sindh are not recognized as significant by the national authorities. This is in part because limited resources for archeological work barely support even the most important sites. It is also in part because some sites might be important to Sindhis or to local groups.³³⁸
432. A report by the IUCN-The World Conservation Union listed 133 sites important to the heritage of the Sindh. “*Roopa Ma’ari: the ruins of Sindh’s ruler Dodo Soomro’s palace near Badin*” is among them.³³⁹ Many more of these sites lie within the areas included in the NDP Project. Most of the sites listed in the IUCN report are as yet unprotected and unexcavated. Some are already lost.³⁴⁰ It is clear there are numerous sites throughout Sindh, below and above ground, that are not protected, have not been assessed, and certainly have not been explored as important cultural heritage sites.

3. Impact of Flooding, Waterlogging and Salinity

433. While flooding can cause considerable and immediate damage to any site, the combination of waterlogging and salinity can destroy archeological remains and relics over the long-term. Waterlogging alone can help preserve archeological remains, including biological tissue, particularly under anaerobic conditions.³⁴¹ Salt is a corrosive. Combined with water it will seep into and severely damage objects.
434. The irrigation works of the Indus Valley led to a higher and more saline water table in the ruins of Moenjodaro. The fluctuating water level exposed the sub-surface materials to periodic exposure to saline water and air, speeding up the oxidative corrosion of metal objects and damaging the stability of other materials such as the mud bricks that were the chief building material of the Harappan culture.³⁴² Drainage is necessary to preserve these sub-surface remains, but must be done with care, so that some materials such as the bricks are not further damaged from salt crystallization.³⁴³ The damage has been well-documented at already unearthed sites like Moenjodaro; waterlogging by saline water will destroy many more sites before they can be discovered.

³³⁷ International Council on Monuments and Sites (ICOMOS), World Heritage List No. 143, Historical Monuments of Thatta, April 1981.

³³⁸ Numerous prehistoric and early historic sites in the upper and middle reaches of the alluvial plain of the Indus River have yet to be discovered because of a lack of systematic exploration of the area. See Gregory L. Possehl, “Prehistoric Population and Settlement in Sindh” from *The Indus River: Biodiversity, Resources, Humankind*, 1999, eds. Meadows, A., and P.S. Meadows, Karachi: Oxford University Press, pp.394-408.

³³⁹ Anwar Pirzado, *Status Paper on Cultural Heritage in Sindh*, IUCN-The World Conservation Union, Sindh Programme, Draft of October 2002, p. 27.

³⁴⁰ Pirzado, October 2002 draft, p. 18.

³⁴¹ See, for example, Roberta Pini, “Late Neolithic vegetation history at the pile-dwelling site of Palù di Livenza (northeastern Italy)” in *Journal of Quaternary Science*, Vol. 19, No. 8, pp. 769-781, on the preservation of organic materials from the Neolithic period under anaerobic waterlogging; and *Current Archaeology*, Issue 172 (February 2001), Special Issue on Wetlands, for the advantages of waterlogging, of fresh water, for preservation of organic materials for thousands of years.

³⁴² Khurshin Hasan Shaikh and Syed M. Ashfaq, *Moenjodaro: a 5,000 Year Legacy*, 1981, Paris: UNESCO, pp. 47-48, 56; and DSEA June 1993, p. 6-10.

³⁴³ DSEA June 1993, p. 6-10.

435. High water tables can damage surface structures as well, with capillary action bringing saline water into and damaging the lower parts of buildings. The bricks, tiles, plaster, and decorations of historical sites throughout Sindh are quickly being lost to saline water.³⁴⁴
436. The DSEA pointed out the particular problem of waterlogging of graveyards. Burial in waterlogged soils is not acceptable, and the combination of salt and water will damage several existing, and in some cases historically important, graveyards. *“Drainage is the only way to avoid or mitigate this problem. Moreover, the regard in which ancient as well as modern graveyards are held also makes the development of waterlogging in such sites a major sociological and psychological problem for communities, and one which should be avoided wherever possible.”*³⁴⁵
437. The soils of south Sindh are among the most waterlogged and saline of the Indus Valley. The LBOD, KPOD, and Tidal Link drainage system may have helped reduce water levels and salinity to the north, but they also have contributed to the increased salinization of the groundwater in south Sindh.³⁴⁶ Combined with neglect by national and provincial authorities, both the surface cultural heritage and the as yet undiscovered subsurface cultural legacy will be irretrievably lost.³⁴⁷

4. Assessment of the Claim Regarding Cultural Property

438. Whether or not the Dodo Soomro of the Sindhi ballads is an historical figure, he is an important cultural icon for the people of Sindh. The symbolic importance of Dodo Soomro to Sindhis evident from this translation of a few lines of the ballad:

*“Sindh is the life-breath of the Soomras (...). Their Vagahkot is God's own fort; may it not suffer the slightest indignity. Oh Dodo, glory unto your mother who gave you birth. The warriors of Sindh are fighting the enemy. Oh God, give them victory (...). Let there always be peace and prosperity in this auspicious land (...).”*³⁴⁸

439. Even if the Dodo Soomro buried in the tomb at Roopa Mari is not the folk character of the ballads, he is venerated as so by many. The tomb might not be a valued national cultural site, but it has considerable local cultural value.
440. Though area around the tomb is now barren, it would likely have been settled in the past. The potential archeological value of the site around the tomb cannot be ignored.

³⁴⁴ DSEA June 1993, p. 6-11; and <http://www.thesindh.com/English/Stuff/show.asp?FID=78>

³⁴⁵ DSEA June 1993, p. 6-11.

³⁴⁶ World Bank – Netherlands Water Partnership Program, Pakistan: Drainage Master Plan (DMP) Panel Consultation, Review Report, Delft: 22 December 2004, p. 5

³⁴⁷ Pirzado, October 2002 draft, p. 19.

³⁴⁸ From website <http://hummmomin.com/sms/index.php>, presenting a popular version based on the ballads of the history of Dodo Soomro, accessed July 23, 2005.

441. Many other potentially important cultural sites that have yet to be discovered or if known, as in the case of Roopa Mari, have yet to be excavated are scattered throughout the Sindh.
442. Examples of other World Bank projects show that previously unknown or unexplored sites can be recognized as a cultural or historical landmark during project preparation or even during implementation.³⁴⁹ It is not necessary that they be declared important national heritage sites prior to project approval. Relevant to the current case is the experience with a hydroelectric power project in Kenya, where a survey of the project area found *“numerous traditional sites and shires (...) in the project area. Local people strongly valued these sites and feared the repercussion of damage, inundation or desecration of any of these sites. Each site of importance was identified before construcion [sic] and protected so as to assure continued access by local people.”*³⁵⁰
443. Management cannot be held responsible for a lack of action on cultural heritage at the time of the preparation and implementation of the LBOD Project, since the World Bank had no cultural heritage policy then.
444. However, when the NDP Project was being prepared, a cultural assessment of the drainage areas covered in the project was needed, given the wealth and wide distribution of the Indus Valley’s cultures and historic (and prehistoric) settlements. As suggested in paragraph 3 of OPN 11.03, this assessment could have been a brief reconnaissance survey by a specialist.
445. Management should not have assumed there are no sites of cultural value, just because sites are not listed under the national registry. There can be sites of local importance that are not recognized at the national level, whether for ideological reasons, or because of lack of resources that do not allow widespread archeological exploration and preservation, or because of divisions in responsibilities between national, provincial, and local authorities.
446. **The Panel was not able to find any evidence to substantiate the claim of Requesters that the Project has affected cultural property. The Panel finds, however, that Management should have, during preparation and appraisal, undertaken a brief reconnaissance survey of cultural heritage in areas potentially affected by the Project and consulted with local archeological and historical experts, under OPN 11.03, to determine whether or not any sites of national, regional or local cultural heritage might be adversely affected by the Project. Such an expert assessment could have helped determine if any potentially important sites were threatened by waterlogging and salinity and, conversely, if sites might benefit from effective drainage.**

³⁴⁹ Robert Goodland and Maryla Webb, “The Management of Cultural Property in World Bank-Assisted Projects”, 1987, World Bank Technical Paper Number 62, Washington, D.C.: The World Bank, pp. 27 (Ca rajas Iron Ore Project, Brazil), p. 34 (Monasavu Wailoa Hydroelectric Power I Project, Fiji, as an example of a site where important sites were lost if surveys not taken first), p. 35 (Chixoy Power Project, Guatemala), p. 37 (El Cajon Hydroelectric Project, Honduras), p. 39 (Jordan Valley Irrigation – (Maqarin Dam) Stage II Project, Jordan), p. 58 (Karakaya Hydropower Project, Turkey, an example where significant sites were found during implementation).

³⁵⁰ Goodland and Webb, 1987, p. 42.

E. Resettlement

447. **Requesters' Claims.** The Requesters divided their claim on resettlement in two parts. The first concerned losses that they expected from the NDP project, while the second concerned losses that were already incurred from the LBOD project.
448. The Requesters claim that given recent experience with major floods, they expect more flooding in the future which will force them to leave their *"ancestral homes."*³⁵¹ They believe the proposed extension of the spinal drain will require expansion of KPOD, DPOD, and other drainage canals. Thousands of acres of land would be appropriated and several villages would be displaced.³⁵² This would increase saline effluents and the risk of regular flooding in monsoons during high tides, hence agricultural lands would be adversely affected.³⁵³
449. The Requesters further state that the GoP *"has no approved policy on resettlement."* The Framework for Land Acquisition and Resettlement (FLAR) did not provide a time frame for compensation or a plan for economic rehabilitation of affected persons, and even this Framework was rejected. The Requesters believe their *'land will be acquired under land acquisition act of 1894 for expansion of KPOD, without proper compensation and resettlement and in violation of World Bank policies.'*³⁵⁴
450. Concerning losses due to the LBOD, the Requesters claim that many families were displaced from lands along the main drainage channels and from the Chotiari Reservoir during implementation of the LBOD Project, and that they have not been properly resettled.³⁵⁵
451. The Requesters add that environmental problems of the drainage scheme damaged livelihoods and displaced people from many of the communities in south Badin. The planned extension of the LBOD worries them, since existing disposal problems that already seriously harm the people of the area have not yet been resolved.³⁵⁶ They state that the flow of water south to the Rann of Kutch has been blocked by the KPOD and Tidal Link. Villages have been abandoned because their water is now blocked: only 2 of about 10 remain, and even those have much smaller populations.³⁵⁷
452. The Requesters also add that the breaches in the KPOD during the cyclone of 1999 forced people to abandon their homes for a couple of months, and severely damaged their livelihoods of small/subsistence agriculture, fishing, livestock, and use of forest products.³⁵⁸ They claim that the monsoon rains of 2003 left southern Sindh flooded as it became a drainage bowl for the LBOD system. *'Newspapers reported that (...)*

³⁵¹ Request for Inspection, ¶ 19.

³⁵² Request for Inspection, ¶ 20.

³⁵³ Request for Inspection, ¶ 21.

³⁵⁴ Request for Inspection, ¶ 22.

³⁵⁵ Request for Inspection, ¶ 12.

³⁵⁶ Request for Inspection, ¶ 23.

³⁵⁷ Request for Inspection, ¶ 26.

³⁵⁸ Request for Inspection, ¶ 24.

*agriculture crops standing over 200,000 acres has been destroyed and more than 200,000 villagers have been rendered homeless for couple of months.*³⁵⁹

453. **Management Response.** Management Response on resettlement were divided into five parts. These were: flooding potential; land acquisition; resettlement framework; losses incurred; and livelihoods.
454. Management asserts that lower Sindh was always prone to floods, and that the LBOD State 1 Project reduced the extent and duration of flooding. Implementation of the NDP Project does not worsen flooding.³⁶⁰ Management states that the Bank does not plan to fund expansion of the KPOD, DPOD, or Spinal Drain, so there is no need to acquire new land for those canals. Furthermore, the Bank did not support any subprojects under the NDP Project that require land acquisition or resettlement because of the lack of agreement on the FLAR.³⁶¹
455. Management pointed out that the FLAR was to provide the broad legal, institutional, and implementation framework for resettlement, compensations, and rehabilitation of affected people. Specific timetables and compensation or rehabilitation packages were to have been prepared for the particular subprojects that would have required resettlement, and not as part of the broader FLAR.³⁶²
456. According to Management, the original FLAR was prepared in January 1996, approved by the GoP and agreed upon by the Bank. In January 1998, WAPDA officials objected to a number of provisions. The revised FLAR was proposed in 2001, but agreement was not reached. The Bank decided not to fund any subprojects that involved land acquisition or resettlement.³⁶³
457. Management considers that remaining environmental and social problems from the LBOD system will be resolved with the implementation of the LBOD Environmental Management and Monitoring Plan (which has yet to be implemented). As for the 2003 monsoon storm, Management states that the volume of rainfall was extremely rare, greater than any other storm on record, that this combined with upstream farmers draining their fields and the high tide led to a surface runoff four times greater than the design capacity of the LBOD system, and that such an event is unlikely to reoccur.³⁶⁴
458. Management states that the resource base and socio-economic conditions of south Sindh were already very poor. *“While a poverty-targeted intervention is needed in this area (...) the NDP project is not the right instrument for this and further, that implementation of the NDP project has not worsened the plight of the people living near the dhands.”* Another Bank supported project active in Badin, the National Rural Support Program, carries out various activities to improve livelihoods. Recognizing the severe devastation caused by the 2003 floods, the Bank has also carried out “a

³⁵⁹ Request for Inspection, ¶ 27.

³⁶⁰ Management Response, Annex 1, Item 12, p. 24.

³⁶¹ Management Response, Annex 1, Item 13, p. 24.

³⁶² Management Response, Annex 1, Item 14, p. 25.

³⁶³ Management Response, Annex 1, Item 14, p. 25.

³⁶⁴ Annex 1, Item 14, p. 25, Annex 1, Item 15, pp. 25-26.

*diagnostic study to determine the extent and severity of losses incurred and, in discussion with the district authorities in Badin, formulate a livelihood assistance program, taking into consideration the ongoing programs in the area.*³⁶⁵

459. **Policies.** OD 4.30 on Involuntary Resettlement was operative during the design and implementation of the NDP Project. This operational directive provides the framework for resettling people who have been displaced as a result of development projects. These projects may include, inter alia, construction or establishment of dams and irrigation canals. *“Refugees from natural disasters, war, or civil strife are also involuntary resettlers, but they are not discussed in this directive (see OP/BP/GP 8.50, Emergency Recovery Assistance, discussed below).”*³⁶⁶
460. OD 4.30 states that the Bank’s objective *“is to ensure that the population displaced by a project receives benefits from it. Involuntary resettlement is an integral part of project design and should be dealt with from the earliest stages of project preparation.”*³⁶⁷ It further stipulates that *“[w]here large-scale population displacement is unavoidable, a detailed resettlement plan, timetable, and budget are required.”*³⁶⁸ A core element of OD 4.30 is to achieve *“improvement or at least restoration of (...) former living standards and income earning capacity with particular attention paid to the need of the poorest groups to be resettled.”* The policy specifies the responsibilities and role of the borrower and Management in relation to resettlement.
461. Under the NDP Project, with its flexible process of subprojects, in which *“the specific resettlement needs of each subproject are not known in advance, the borrower would need to agree to resettlement policies, planning principles, institutional arrangements, and design criteria that meet Bank policy and requirements as a condition of the loan.”*³⁶⁹
462. The OMS 2.33 on Social Issues Associated with Involuntary Resettlement in Bank-Financed Projects was issued in February 1980 and effective during the design and implementation for most of the LBOD Project. The policy was established for resettlement in *“projects that entail a major change of land use, such as: (a) the construction of dams for hydro-electric power, irrigation, or water supply which form man-made lakes; (...) and (e) the construction of canals, highways, transmission lines and the like.”*³⁷⁰ An important exception, similar to the later OD 4.30, was that *“[r]efugees and victims of natural disasters may also become involuntary settlers, but are not discussed in this Statement since their relocation is often only temporary.”*³⁷¹
463. The Requester’s claims on resettlement for the affected area deal with three distinct issues: (i) Displacement endured through the cyclone of 1999 and more so by the floods of 2003; (ii) Displacement and loss of livelihood and other environmental

³⁶⁵ Annex 1, Item 14, p. 25, Annex 1, Item 17, p. 27.

³⁶⁶ OD 4.30 (Involuntary Resettlement), June 1990, at note 4.

³⁶⁷ OD 4.30 ¶ 3.

³⁶⁸ OD 4.30, ¶ 4.

³⁶⁹ OD 4.30, ¶ 26.

³⁷⁰ OMS 2.33 (Social Issues Associated with Involuntary Resettlement in Bank-Financed Projects), February 1980, ¶ 3.

³⁷¹ OMS 2.33, at note 1.

problems attributed to the LBOD and Tidal Link; and, (iii) Loss of land due to civil works on existing or new canals.³⁷²

1. Displacement during Cyclone and Floods

464. The 1999 cyclone and 2003 floods forced many people to leave their homes. The destruction of their homes, livestock, and farms, and the deaths of more than a hundred people are well documented.³⁷³
465. **The damage was widespread and included the loss of families and the deaths of many men, women and children** Table 4 below, established by the University of Hyderabad from various sources³⁷⁴ provides an overview of the damage caused by the cyclone in 1999.

Table 4: Damages Suffered during Cyclone of 1999

Damage	Thatta District	Badin District
Human Losses		
Male	49	43
Female	18	7
Children	61	13
Injured	50	115
Missing	139	11
Housing		
Destroyed complete	25534	51293
Partially destroyed	20659	40943
Boats destroyed	609	66
Crop Damage (ha)		
Cotton	-	3350
Sugarcane	65582	55700
Paddy	24800	91123
Livestock Killed		
Sheep/Goats	7402	11431
Buffalo	1029	2059
Cow	1765	2011

466. The losses during the floods of 2003 also were devastating. Over 100 people died, over 5,000 animals perished, a third of the people in Badin were directly affected, and over 100,000 hectares of cropland were damaged, as indicated by Table 5 below.

³⁷² Issues relating to Chotiari Reservoir are addressed separately.

³⁷³ See for example Oxfam GB, Pakistan Programme, "Post Flood Assessment in Badin and Thatta Districts, Sindh", Pakistan, October 2003; and The World Bank, "Diagnostic Study and Proposal for Livelihood Improvements: Badin and Thatta Districts, Sindh, Pakistan", April 2005. See also section G on Social Impacts of Recent Disasters and Apparent Contribution of LBOD System, Recent Disasters, of this Chapter.

³⁷⁴ University of Hyderabad, Socio/economic Impact of Cyclone 2a, Hyderabad 2000.

Table 5: Extent of Damage Caused by 2003 Floods

Description	Badin	Thatta
Area (Sq Km)	17,425	17,355
Population (Millions)	1.136	1.100
Affected Population	366,000	195,000
No of Talukas	5	9
Affected Talukas	3	5
Persons Killed	86	38
Animals Perished	5,462	100
Cropped Area Affected (acres)	226,000	47,000
Houses Fully Damaged	56,000	24,738
Houses Partially Damaged	135,850	74,975

Source: UN Assessment Report. 2003.³⁷⁵

467. The descriptions by the people who lived through these events are heartrending (see Box 5 below).

Box 5: Losses from the 2003 Floods: In Villagers' Own Words

The words of the people who lived through the floods:

“When the rains came, the canals filled with water and the skies filled with water.”

“The LBOD is a sword hanging over us. If the waters are allowed to flow their natural course, we will be saved. If the LBOD is kept, we will be destroyed.”

“Before the floods all of us [women] raised sheep and goats. We had about 500 sheep and 500 goats. All our sheep and goats died. For the last two years our children have not had any milk. They are often sick.”

“The rain took away my mother, my brother, and my cattle. I cannot do anything.”

“Four of our family had to climb the tree to escape the floods. I had just given birth. I held my baby. But after two days I fell asleep, and my newborn baby slipped from my hands into the flood waters.”

468. Though they are still suffering from the losses of 2003, their dislocation was temporary. Many returned to their original communities within two to three months after the flood. Nevertheless, the Panel wishes to underscore the concern that the floods are not a one-time event, and that the heightened threat of dangerous flooding is ongoing.

³⁷⁵ Reproduced in Diagnostic Study, 2005, p. 23.



Picture 6: Villager Recounting Losses Suffered during the Cyclone of 1999 and the Flood of 2003

469. The Panel notes that assistance for involuntary displacement caused by disasters, whether natural or human-made, can fall under the Bank’s Policy on Emergency Recovery Assistance, OP 8.50.³⁷⁶ Some of the Bank’s actions after the 2003 floods (conducting technical and social/economic assessments) are consistent with the provisions OP 8.50.
470. While the Bank can be commended for conducting what amounts to a self-evaluation in its assessment of the LBOD and a tacit admission of the social and economic hardships that have been caused by the combination of natural disaster and faulty construction and/or management of the drainage system, the timing of these studies seem to show that the Bank responded to the disasters of south Sindh only after a Request for inspection was brought forward.³⁷⁷
471. In the present case the Panel found that the drainage structure supported by the Bank is likely to have compounded the effects of the storms and floods of 1999 and 2003, which caused severe harm. While the GoP requested Bank assistance for emergency

³⁷⁶ OP 8.50 (Emergency Recovery Assistance), August 1995, states that “[a] country may request assistance from the Bank when it is struck by an emergency that seriously dislocates its economy and calls for a quick response from the government and the Bank.” It further states that “[t]he main objectives of emergency recovery assistance are to restore assets and production levels in the disrupted economy. The Bank finances investment and productive activities, rather than relief or consumption, and focuses on areas of its comparative advantage.” Emergency assistance can involve “(a) immediate support in assessing the emergency’s impact and developing a recovery strategy; (b) restructuring of the Bank’s existing portfolio for the country, to support recovery activities; (c) redesign of projects not yet approved, to include recovery activities; and (d) provision of an emergency recovery loan (ERL).”

³⁷⁷ This was confirmed in discussions with Bank staff.

repairs to the LBOD system,³⁷⁸ **the Panel found no evidence that Project funds were used to redress damage to the affected people or to restore their productive capacity and livelihoods in response to the floods and the degradation of the resource base, although such financing would have been available under the provisions of OP 8.50. This is in contrast with the US\$135 million transferred through DERA for relief from drought.**

2. Displacement caused by Long-Term Loss of Livelihood and Ongoing Flood Risk

472. A constant complaint among all communities visited by the Panel was the intrusion of sea water far inland, the salinization of the groundwater, and the subsequent salinization of the soil.
473. The increased salinization of the ground water is attributed by many in the affected area to be due to the intrusion of sea water and the increased effluent brought to the area by the LBOD. The Panel found that the structures have contributed to sea water intrusion.³⁷⁹ People claim that their drinking water has become so brackish in recent years (in some areas as recent as two to three years ago, in others as much as eight years ago) that it is not longer fit to drink.
474. The Panel heard from local people south of the canal that the water in their villages was no longer fit to drink or grow crops, and they had to walk several kilometers across the canal for water. Even that water was good for only certain months out of the year. They claimed that several villages had been nearly completely abandoned. The Panel notes, at the same time, that it is difficult to disaggregate the many causes that have contributed to increased salinity of the ground water, among them the decreased supply of fresh water in the Indus River below the Kotri Barrage, the drought of recent years that further decreased the availability of fresh water, and the natural conditions of being a recent alluvial deposit near the sea.
475. The increased salinity has also made vast tracts of agricultural land unproductive. Many villagers interviewed by the Panel claim their land has become so barren, that they can no longer plant anything of value.³⁸⁰ They are now forced to earn their living by producing charcoal from brush. The Panel noticed that not far upstream from these barren lands were large holdings of sugar cane, which require substantial irrigated water.
476. A drastic decline in fish species and in the number of fish has also been attributed to the failure of the Tidal Link and the intrusion of seawater much farther inland. While there can be no debate that the types and amount of fish and other commercial species has declined, it is difficult to attribute this solely to the LBOD and Tidal Link.

³⁷⁸ Management Response, Annex 1, Item 8, p. 21, (stating that in July 2003, following the floods of that year, the GoP requested the Bank for assistance under the NDP Project for “emergency repairs to the LBOD system,” and the Bank approved the use of NDP funds for “emergency repairs to the KPOD.”).

³⁷⁹ The effect of the collapse of the Cholri Weir and the issue of intrusion of sea water is covered in the technical chapter of the report (See Chapter 2).

³⁸⁰ Asianics Agro-Dev International, “Tarbela Dam and related aspects of the Indus River Basin, Pakistan,” prepared for the World Commission on Dams, 2000. p. 98.

477. In 2001, a World Bank mission found that a “*first major risk*” is that there will remain an uncontrolled connection between the Tidal Link canal and the dhands, which “*results in substantial and irreversible damage to the ecosystem, habitat, and fisherie in the dhands.*”³⁸¹ The mission also states that the:

*“changes in biodiversity and habitat (...) could adversely affect the fishery yields particularly of commercially important species. Hence the second major risk is the loss of livelihood by the poor fishermen who depend on the Dhand fishery, and farmers whose lands could be adversely affected by high water levels in the Dhands (either temporary or persistent). Fishermen have been heavily fishing the canal since its completion, but there has not been any systematic monitoring of yields in the canal, and presently in the Dhands, in comparison to before project conditions.”*³⁸²

478. Another report, prepared in April 2003, before the devastating floods of that year, found that “*there are two issues involved in the failure of Tidal Link channel. One, the loss of employment for the already deprived people served by the Dhands and two, the discharge capacity of the structure at the head of the Tidal Link. The first issue is significant as the affected populace is politically and economically depressed and would not be compensated unless an arm like the World Bank takes up their cause.*”³⁸³

479. The problem of the livelihood of the fishermen is not caused only by the failure of the Tidal Link. Several reports stress that over fishing, especially by large commercial vessels near the shore; the lack of freshwater released into the Indus River below the Kotri Barrage and years of drought, both of which would reduce the freshwater input into brackish waters; and the environmental devastation caused by the recent natural disasters have also likely contributed to the decline of commercially valuable marine species and stock, as have the increased flow of effluents in the Spinal Drain and the intrusion of seawater into the dhands.³⁸⁴

480. The Requesters claimed during the field visit of the Panel that several communities in the affected area have been abandoned because of the loss of livelihood.

481. The Panel considers that fisherman, farmers and herders who have substantially lost their livelihoods due to project-related impacts, and people put at higher ongoing risk of catastrophic floods, may very well be displaced against their will. While other factors may have contributed to these harms, this does not necessarily bar the application of relevant Bank policies to redress these harms and restore lost livelihoods.

482. NDP Project documents at appraisal refer to assurances of the Borrower that land acquisition and involuntary displacement will be handled in accordance with Bank policy, and note specifically the issue of land acquisition for civil works. The

³⁸¹ Fact-Finding Mission, March 2001, ¶ 37.

³⁸² Fact-Finding Mission, March 2001, ¶ 38.

³⁸³ The World Bank, Pakistan National Surface Drainage System (NSDS) Panel Consultation: Review Report, Draft Final Report, Islamabad, April 23, 2003, p. Annex 8-8.

³⁸⁴ Asianics Agro-Dev International, 2000, p. 97.

documents do not, however, refer specifically to the possibility of the type of displacement noted above.

483. The Panel considered whether the Bank should reasonably have anticipated that the Project could lead to such displacement. OD 4.30 on Involuntary Resettlement would be applicable if appropriate risk analysis under the Project indicates a significant possibility that the Project will cause or substantially contribute to involuntary relocation. The Panel notes that there were significant concerns about the Tidal Link structures prior to Project appraisal. The 1989 EIA for the LBOD indicated that, under several scenarios, the Tidal Link could fail and that “[f]ishing, and the livelihood of those fisherman dependent on the dhands, would be drastically affected.” The Panel’s analysis determined that the selected route was technically and environmentally risky, the land was subject to storm events and the Bank underestimated risks to residents along the structures during construction and design (see above). In 1996, one year after it opened, the Cholri Weir began to break down.
484. OD 4.30 states that “*the possibility of involuntary resettlement should be determined as early as possible and described in all project documents.*” **The Panel recognizes that the Tidal Link situation was in flux at appraisal, but notes that signs of major risk were present. The Panel observes that the Bank, at appraisal, failed to identify emerging risks that LBOD/Tidal Link problems could lead to significant harms and even displacement of local people, even though the Project had plans to complete and expand LBOD.**
485. Just a few months after appraisal, in June 1998, a large section of the weir collapsed. The situation worsened with the near total collapse of the weir in the cyclone of 1999. When the 2001 Bank Fact-Finding Mission determined that repair of the weir and embankments was not feasible, Bank staff acknowledged the “*major risk*” of loss of livelihood. The Panel found no evidence, however, of planning for protective resettlement.
486. The great risks faced by the people came to pass with the floods of 2003, and are ongoing. A Bank report in April 2003 states that because the affected people are politically and economically depressed, they “*would not be compensated unless an arm like the World Bank takes up their cause.*” **The Panel finds that the Bank failed to take the necessary actions under OD 4.30 to identify and prepare for the possibility of such displacement, and to assess the extent to which it has occurred**
487. For vulnerable groups, OD 4.30 calls for “*land allocation or culturally acceptable alternative income-earning strategies to protect the livelihood of these people.*” **Given that the NDP Project is closed, the Panel is concerned about what may be done to redress harms, protect against possible ongoing displacement, and support livelihoods .**

3. Loss of Land due to Civil Works

488. The third claim in the Request involves loss of lands acquired to expand existing canals and to build new canals. The Requesters and residents in the affected area repeatedly expressed their concern that the northward extension of the LBOD system

would require expansion of existing drainage canals, and this would require acquisition of their lands. Assurances that the LBOD will not be extended are met with skepticism. The Panel found no evidence of dislocation of people due to civil works during the NDP Project.

489. The approach taken by Management to address potential dislocation due to civil works is reflected in the Framework for Land Acquisition and Resettlement (FLAR). The FLAR was prepared by the Government of Pakistan based on agreements with the Bank.
490. Under the FLAR it was recognized that the existing legislation did not adequately cover compensation for project affected persons (PAPs) other than landowners. The FLAR expanded the definition of PAPs to include tenant farmers, agricultural laborers, tribal people whose land may be acquired, landless who cultivate government land to be acquired, homestead owners, and others such as those *“dependent on the land either directly or indirectly, and having a client relationship with the displaced community.”*³⁸⁵
491. In addition to land compensation, the FLAR was to *“provide entitlements to rehabilitate persons who lose their land, property and those whose livelihood is affected through land acquisition (such as those whose employment is affected).”*³⁸⁶ Thirteen different entitlement packages were designated, depending on the relationship of PAPs to the land and the extent of land acquisition. Land was purchased when appropriate, new lands provided, new infrastructure or physical structures provided, new employment opportunities and training provided. Losses were intended to be minimized.³⁸⁷ Entitlement programs were to include women and other vulnerable groups.³⁸⁸ Participation by the PAPs was to have been central to the preparation and implementation of the RAPs, through public meetings, consultations, and the mediation of Pakistani NGOs.³⁸⁹
492. A review of documents concerning the FLAR confirms that agreement had been reached between the Bank and the Borrower on the FLAR before the project was approved. The Borrower objected to the FLAR only after the NDP Project was initiated.
493. The FLAR estimated that about 9,500 acres (3,800 ha) of land would need to be acquired for the investment projects under the NDP Project.³⁹⁰ After the Borrower objected to the FLAR, the Bank decided not to fund any of the project components that required resettlement.
494. A resettlement program did continue for those families displaced by the Chotiari Reservoir, one of the largest components of the LBOD Project carried over into the

³⁸⁵ Water and Power Development Authority (WAPDA), National Drainage Program – 1: Framework for Land Acquisition and Resettlement (FLAR), Lahore, Pakistan, January 1996, p. 5 (section 4.1).

³⁸⁶ FLAR, p. 8 (Section 6.1 [1]).

³⁸⁷ FLAR, pp. 9-11 (Section 6.2).

³⁸⁸ FLAR, p. 12 (Section 6.3.2 [a]).

³⁸⁹ FLAR, p. 14 (Section 9.1).

³⁹⁰ SAR (NDP), p. 34.

NDP Project. While the Bank did not fund this component of the project after the rejection of the FLAR, the Saudi government provided funding as part of the overall NDP Project, and the Bank as lead donor agency continued to have an obligation to supervise the resettlement component of the Chotiari Reservoir.³⁹¹

495. **The Panel finds the FLAR to be an appropriate document which was consistent with the requirements of OD 4.30. The preparation of the FLAR, the initial agreement with the Borrower, and its acceptance as part of Project appraisal, were consistent with Bank policy requirements. The Panel notes that following the Borrower's rejection of the FLAR, the Bank decided to withdraw funding from those Project components which, in Management's view, required resettlement. This was also consistent with OD 4.30.**
496. **Aside from the unresolved issues of Chotiari Reservoir, the Panel found no evidence of dislocation of people due to civil works during the NDP Project.** The Panel notes, at the same time, that Requesters and residents in the affected area repeatedly expressed their concern that extension of the LBOD system into Punjab would require expansion of existing drainage canals, which would require acquisition of their lands. Assurances that the LBOD will not be extended are met with skepticism.

F. Consultation, Participation and Disclosure

497. The Requesters claim that local communities, especially in affected areas, were not informed of the plans for the NDP Project or of its environmental assessments.³⁹² They claim that there is a lack of institutionalized means to share information or consult with affected people.³⁹³ Project planning was *"the business of few bureaucrats and donors and project implementation remained non-transparent and hence failed to obtain informed consent since the outset."*³⁹⁴ According to the Requesters, most villagers only learned of the NDP with the rains of 2003, when they were informed that more effluents would come through the LBOD system.
498. The Requesters further claim that *"NGOs involved in advocacy campaign with the World Bank have been refused vital information with regard to completion report of LBOD and feasibility studies of NDP."*³⁹⁵ They add that few project related documents were made available. Those which were available were in English, which cannot be read by most people, and in government offices distant from the affected area.³⁹⁶ The Requesters expressed their frustration that efforts (including protests, phone calls, and other communications) to contact local authorities and World Bank officials and convey concerns about the project received little positive response.³⁹⁷

³⁹¹ Interviews with Bank staff.

³⁹² Request for Inspection, ¶ 55.

³⁹³ Request for Inspection, ¶ 55.

³⁹⁴ Request for Inspection, ¶ 55.

³⁹⁵ Request for Inspection, ¶ 55.

³⁹⁶ Request for Inspection, box p. 23.

³⁹⁷ Request for Inspection., pp. 23-25

499. Management responded on consultation that they were held in preparation of the DSEA in 1991 and 1992 with government stakeholders and professional representatives.³⁹⁸ Adding that the NDP was considered a way *“to bring together concerned government agencies and NGOs/CBOs (...) for open and transparent discussions.”* Consultations, Management states, were held with representative NGOs, FOs and CBOs during project preparation, while local consultations were held during preparation of the subprojects.³⁹⁹ Management adds that during 1997-1998 the NDP project worked with representative NGOs to establish a partnership framework, so that NGOs would be involved in the all levels of project policy and decision making, and a briefing note with basic information on the NDP project was translated and shared with participants in advance of the NGO meetings.⁴⁰⁰
500. On participation, Management states that a team *“visited local communities in Badin and other areas”* where it *“met with local community groups and farmers and obtained feedback,”* and met with local intermediary organizations *“and invited them to join on these visits.”*⁴⁰¹ Management adds that stakeholder views were considered in the design of subprojects.⁴⁰²
501. Management further states that *“[t]hrough the formation of FOs, the NDP project has provided opportunities to marginalized groups, such as sharecroppers and farmers at the tail end of the system, to participate in decision-making on water allocations among farmers.”*⁴⁰³ All on-farm investments were and are *“implemented through farmer participation”* and that water distribution *“is prepared in consultation with FO representatives.”*⁴⁰⁴
502. Management acknowledges that *“the NDP project was not in compliance with BP 17.50, Disclosure of Operational Information, since the DSEA was not disclosed prior to appraisal at the Infoshop and no records of disclosure in country could be located.”*⁴⁰⁵ Concerning other documents, the FLAR and PID, Management state they were disclosed in a timely manner in May 2001 and October 1994, respectively, at the Infoshop. The updated PID was also disclosed in compliance with BP 1750.⁴⁰⁶
503. Management also acknowledges that only one document from the preparation phase was located that had been translated into local languages. However, since 2001, *“a periodic bulletin on the NDP project has been disseminated in Sindhi to farmers and other stakeholders.”*⁴⁰⁷ Concerning subproject preparation, Management states that *“[s]ocial and environmental screening reports for those subprojects were not disclosed. None of the subprojects warranted a full EIA; therefore disclosure was not undertaken.”*⁴⁰⁸

³⁹⁸ Management Response, Annex 1, Item 11, p. 23.

³⁹⁹ Management Response, Annex 1, Item 11, p. 23.

⁴⁰⁰ Management Response, Annex 1, Item 11, pp. 23-24.

⁴⁰¹ Management Response, Annex 1, Item 11, p. 24.

⁴⁰² Management Response, Annex 1, Item 11, p. 24.

⁴⁰³ Management Response, Annex 1, Item 23, p. 30.

⁴⁰⁴ Management Response, Annex 1, Item 23, p. 30.

⁴⁰⁵ Management Response, ¶ 43.

⁴⁰⁶ Management Response, Annex 1, Item 23, p. 31.

⁴⁰⁷ Management Response, Annex 1, Item 23, p. 31.

⁴⁰⁸ Management Response, Annex 1, Item 23, p. 31.

1. Consultation and Participation

504. **Policies.** The issues of consultation and participation are addressed in several operational directives and policies. Some were relevant during the LBOD project. OMS 2.33 on Social Issues Associated with Involuntary Resettlement in Bank-Financed Projects, February 27, 1980, stressed the need for careful preparatory work, consultation with, and participation of those required to resettle involuntarily under a project and those expected to host the new settlers.⁴⁰⁹ OMS 2.36 on Environmental Aspects of Bank Work, May 7, 1984, provided guidelines for the Bank and Borrowers to incorporate environmental components in IDA-funded projects, but did not require (nor mention) consultation with or participation of those affected by the projects. The World Bank policy on disclosure of information was introduced in 1994.

505. When the NDP Project was prepared and appraised, other Bank policies were in place that had provisions on consultation, participation, and disclosure. OD 4.01 on Environmental Assessment states that:

*“The Bank expects the borrower to take the views of affected groups and local NGOs fully into account in project design and implementation, and in particular in the preparation of EAs.”*⁴¹⁰

*“Such consultations should occur at least at the following two stages of the EA process: (a) shortly after the EA category has been assigned, and (b) once the draft EA has been prepared.”*⁴¹¹

506. While the primary responsibility for consultations lies with the borrower, Paragraph 3 of Annex D of OD 4.01 states:

*“The Bank should ensure that the TORs [for the EA] provide for adequate interagency coordination and consultation with affected groups and local nongovernmental organizations (NGOs).”*⁴¹²

507. OD 4.30 on Involuntary Resettlement provides a framework for involvement of those who are to be resettled and, where applicable, those who are expected to host the resettled population.⁴¹³ The Bank’s appraisal mission for a project involving resettlement needs to determine “*the extent of involvement of beneficiaries*” in preparation of resettlement plans.⁴¹⁴

508. **Field Visits and Documentation.** Villagers that the Panel interviewed in the affected area do not distinguish between the LBOD Project and the NDP Project. In their minds it is one continuous program, which brings both saline waste water from the north and sea water from the south into their ground water and lands.

⁴⁰⁹ OMS 2.33, pp. 2 and 3.

⁴¹⁰ OD 4.01, ¶ 19.

⁴¹¹ OD 4.01, ¶ 20.

⁴¹² OD 4.01, Annex D, ¶ 3.

⁴¹³ OD 4.30, ¶ 8.

⁴¹⁴ OD 4.30, ¶ 30.

509. None of the villagers who were questioned recalled any consultation initiated by government agencies or NGOs concerning the construction or expansion of the LBOD, KPOD or Tidal Link. Local residents claimed that they had learned about these works when machinery arrived.
510. Some villagers say they spoke up against the projects, telling supervising engineers on the project site of their concerns about the design. They were concerned that the outflow canals to the Tidal Link were cutting across and so would impede the natural north-south flow of water. They were also concerned that the east-west flow of these canals went against the prevailing west-east winds which could lead to severe erosion of the canal banks, and that the Tidal Link would bring seawater further inland. They said they received no response. Villagers claim one engineer was fired who agreed with them that the design was flawed.
511. Local residents said they first heard about the NDP in 2003, when NGOs learned about some of the institutional arrangements being set up. According to residents of one village, irrigation officials came about two years earlier to tell them that there were plans for expansion of the LBOD, so they should get ready to protest.⁴¹⁵
512. While one of the three AWBs in the Sindh included parts of south Badin, villagers interviewed by the Panel said they were not involved in any FOs, nor did they participate in irrigation activities. Officials of SIDA mentioned that not all the communities had yet been organized in the more recently established AWBs, including the one covering parts of Badin.
513. Residents of the affected area claimed that Bank missions visited their communities only after the flooding in 2003.
514. Early LBOD Project documents have little mention of participation or consultation. These were not explicit requirements of Bank policies, except for resettlement, when the LBOD project was prepared or even during most of its initial implementation. It was seen as primarily an infrastructure project with significant environmental and economic benefits to the agricultural sector, “[t]he objective of the project’s socio-economic evaluation study would be to assess the project’s impact on agricultural production, farmer incomes and employment levels, and, to a lesser extent, on the regional economy (...). [T]hese findings would be used to assess appropriate cost recovery levels from the direct beneficiaries.”⁴¹⁶
515. LBOD documents on resettlement plans included extensive reference to the need for sufficient consultation and collaboration with the communities to be resettled.⁴¹⁷ However, when the project was officially completed (December 1997), the

⁴¹⁵ This could well have been some provincial irrigation officials, who object to the proposed extension of the LBOD into Punjab.

⁴¹⁶ Issues Paper, April 1984, p. 11.

⁴¹⁷ See, for example, Sir M. MacDonald and Partners Ltd., Resettlement Plan and EIA for Chotiari Reservoir and Nara Remodeling, Issues Note, September 1993.

resettlement program was still not implemented.⁴¹⁸ Work on the Chotiari Reservoir, including all the resettlement issues, were carried over to the NDP Project, and are discussed separately in the section on resettlement.

516. A significant change in the approach to the LBOD project is evident in documents from the mid-term review in 1994, which stated that “[b]eneficiaries understanding of the project needs to be improved. It is evident that tenant farmers and women need to receive greater information about LBOD, in particular their entitlements to compensation for disruptions caused by construction works.”⁴¹⁹ Among the Bank’s recommendations to the borrower’s implementing agency (WAPDA) was that more local level liaison staff be hired, and that at least half of these be women.⁴²⁰
517. From its inception, the NDP Project was committed to consultation with stakeholders and expected beneficiaries, and to participation of the expected beneficiaries. As expressed in the General Guidelines to investment projects presented in the SAR, “[a]ll Investment Projects funded under NDP would meet criteria to (...) involve beneficiary participation and consultation during the entire Investment Project cycle.”⁴²¹
518. The project was designed to assure beneficiary participation through formation of Farmer Organizations and Area Water Boards. Investment Projects were to be considered only after sufficient institutional reform set up the Farmer Organizations, Area Water Boards, and Provincial Irrigation and Drainage Authorities that were to operate the irrigation and drainage systems.⁴²²
519. It appears from various mission documents that implementation fell far below expectations. As pointed out in a mission in late 1998 to review progress in social components of the project,

*“(i) PDC [Pakistan Drainage Consultants] lacks the capacity for adequate social assessments and skills for social mobilization; (ii) inadequate gender and local perspectives in social scoping exercises; (iii) lack of coordination between provincial NDP Cells and PDC; (iv) rules and regulations for Farmer Organizations are pending, and other options for the interim period have not been explored or documented; (v) lack of interaction and communication between Provincial NDP Cells, PIDAs, other participating agencies, and NGOs; (vi) high priority training needs for reorientation of staff of participating agencies are not being addressed; and no staff with appropriate skills to meet the challenge of social development aspects with any of the PIDAs, or the NDP Coordination Cells.”*⁴²³

⁴¹⁸ Left Bank Outfall Drain (LBOD) Stage 1 Project (CR.1532-PAK), ICR Mission January 12 -January 13, 1998: Back to Office Report, February 5, 1998.

⁴¹⁹ The World Bank, Left Bank Outfall Drain (LBOD) Stage 1 Project, Cr. 1532 -PAK, Joint Donor Review Mission, JRM, February 4-28, 1994, April 4, 1994, p. 21.

⁴²⁰ Joint Donor Review Mission (LBOD), April 1994, p. 21.

⁴²¹ SAR (NDP), p. 50.

⁴²² SAR (NDP), p. 48.

⁴²³ Pakistan: National Drainage Project (Cr. 2999 -PAK) Social Development & Financial Management Thematic Review and Programming Mission: November 23 – December 10, 1998, Draft Aide-Memoire, n.d., pp. 2-3.

520. The same report found that most contact between the NDP project and NGOs, which were expected to facilitate with consultation and participation of project beneficiaries, was informal. Formal meetings with NGO representatives tended to occur mainly during Bank missions.⁴²⁴ Documentation provided by Management confirms that:

*“The Mid-Term Review in March-April 2001 stressed again the need for further reforms, including greater beneficiary participation mostly by making FOs, AWBs, and PIDAs functional and autonomous.”*⁴²⁵

521. While consultation with Project beneficiaries in the irrigated areas was not always satisfactory, it was almost non-existent during Project preparation in the non-irrigated areas of southern Badin. Only with the collapse of the Cholri Weir and the extensive breaching of the Tidal Link, some attention was given to the problems in southern Badin. This is reflected in the several studies on the impacts to the LBOD, the dhands, and the surrounding area. The Government of Sindh and the Bank commissioned three studies, one on technical aspects, another on environmental and social effects, and a third as a Fact-Finding Mission.⁴²⁶

522. The GoS report on environmental and social effects noted that on at least three occasions in 1996 and 1997, Provincial and Federal officials were informed by local residents of their concerns and fears of the obvious erosion of the Tidal Link.⁴²⁷

523. This report noted that the initial mission on environmental and social effects in December 2000 found “[s]ince Tidal Link is constructed in a Mud flat coastal area with no population and agriculture, no social mobilization has happened due to breaches.”⁴²⁸ The summary of conclusions and recommendations of this mission had no other mention of possible impacts on people in the area.

524. The GoS report did suggest involvement of local communities and stakeholders in the area in the implementation of the Environmental Management Plan. This was to include development of eco-tourism, sustainable fisheries, and other means of livelihood for local residents, the provision of health care and basic infrastructure, as well as establishment of community based organizations for local participation in environmental protection and conservation.⁴²⁹ There is no evidence in any documents provided to the Panel that these proposals were ever implemented.

525. Management recognized the impact of the floods during the DMP Panel of Experts Mission, with a meeting in Badin city, one of the first Management efforts that

⁴²⁴ Social Development & Financial Management Thematic Review and Programming Mission, November 23 – December 10, 1998, Draft Aide Memoire, n.d., p. 9.

⁴²⁵ National Drainage Program (NDP) Project: Joint World Bank, ADB, and JBIC Mid-Term Review (MTR) Mission, Draft Aide Memoire, Annex 4, “Provincial Institutional Reforms,” April 10, 2001.

⁴²⁶ Management Response, Annex 2, p. 34.

⁴²⁷ Government of Sindh, Report to Formulate Environmental Package for Rehabilitation of Affected areas of Tidal Link, October 2001, p. 3.

⁴²⁸ Report to Formulate Environmental Package for Rehabilitation of Affected areas of Tidal Link, 2001, p. 9.

⁴²⁹ Report to Formulate Environmental Package for Rehabilitation of Affected areas of Tidal Link, 2001, pp. 16-17.

intentionally sought the views of the people affected by the floods.⁴³⁰ The report of the Panel of Experts on the DMP, however, does not explicitly address the problems of the affected people in south Sindh.

526. Management and the Government of Sindh reacted to the disasters in south Sindh by commissioning two reports in December 2004. One is a Panel of Experts review of the LBOD performance and the other is a Diagnostic Study of social and economic conditions in the region. It is noteworthy that these reports were commissioned after the Request for Inspection was sent to the Inspection Panel in September 2004.
527. The Diagnostic Study is a thorough analysis of the conditions in the area, including an assessment of the damages caused by the floods in 2003 and the responses by the federal and provincial governments, NGOs, and donor community. The study provides a comprehensive review of the decline of the natural resource base in the region, and the effects of that decline on the lives and livelihoods of the communities. It includes proposals for several interventions that would *rehabilitate and reinstate those livelihood sources affected by natural disasters, introduce alternative sources of livelihoods where it is feasible and help in strengthening and supporting some of the coping mechanisms that would lead to more sustainable sources of livelihoods.*⁴³¹ The report was shared with the Federal and Provincial governments, after which funding was expected, likely from existing sources of credit since it is proposed as a fast-track program. Many of the activities are expected to be implemented directly by community organizations with the assistance of local and international NGOs already active in the area.⁴³²
528. The IPoE Review Performance of LBOD made several remarkable admissions about the impact of LBOD on the people in south Sindh. Among them:

*“Notwithstanding the favorable and important repercussions of the drainage provided in the upper areas of the district, the system has not significantly benefited the lower rural areas in coastal Badin that have some access to land.”*⁴³³

*“As per the events in July 2003 local elected authorities firmly indicated to the Mission that the amount of water received at the lower Badin was unprecedented. The main reasons, in their views were: the additional volume collected by the drainage system at the higher lands and the performance of the outfall system.”*⁴³⁴

*“From the perspective of most of the concerned stakeholders, LBOD did not fulfill expectations in the lower Badin.”*⁴³⁵

529. The IPoE review of the LBOD recognized that participation of local residents and authorities will be crucial in efforts to solve the problems in the affected area. In

⁴³⁰ DMP Panel Consultation, Review Report (Third Draft), October 2, 2004, pp. Annex 7-8 – 7-9, on meeting in Town Hall of Badin.

⁴³¹ Diagnostic Study, 2005, p. 33.

⁴³² Diagnostic Study, 2005, pp. 34-37.

⁴³³ Pakistan: Review of the Performance of the Left Bank Outfall Drain Stage I (KPOD, DPOD, Tidal Link and Cholri Weir): Report of the World Bank International Panel of Experts, May 2005, p. 21.

⁴³⁴ Review of the Performance of the Left Bank Outfall Drain Stage, 2005, p. 21.

⁴³⁵ Review of the Performance of the Left Bank Outfall Drain Stage, 2005, p. 27.

something of an understatement, the report mentions that “[a]t present there are uncertainties and anxieties due to the experience during the 2003 flood. In the past, people did not substantively participate in the design of the project according to their perceptions, which in turn, were not reflected in the design of LBOD drains.”⁴³⁶

530. **Assessment of Claims on Consultation and Participation.** The Panel notes that at the time of the initiation of the LBOD project, Bank policies did not clearly set forth requirements for consultation and participatory processes. The relevant policies were initiated only in the latter stages of the project.

531. In reviewing the NDP Project, consultation and participation is assessed at three stages: (1) project preparation, (2) project implementation, and (3) after the disasters of 1999 and especially of 2003. These are discussed below.

- Project Preparation

532. As a national-level project, covering most of the two most populous provinces of Pakistan, it cannot be expected that everyone who is possibly affected by the NDP Project could be informed or consulted prior to implementation. It is reasonable to expect, however, an effort to reach as many people as possible through intermediaries, especially NGOs that work with the communities in the project area, in particular where project activities are planned.

533. From the review of documents, it can be seen that Management made an effort to meet with NGOs and with farmers during pre-appraisal missions. The people in the affected areas of Badin did not receive information about the project.

534. As noted previously, remedial works on the Tidal Link were included in the NDP Project, and the involvement of local communities and NGOs was considered a necessary part of this work: “(f) the GOP/GOS, the local community in Badin which would be affected by the Tidal Link, NGOs (preferably acting through their ‘Network’), and other stakeholders with legitimate interests in the function of the Tidal Link would need to endorse the proposed long-term solution.”⁴³⁷ The Bank staff found, however, that “the requirements listed above do not appear to have been met so far, or being met in the immediate near future.”⁴³⁸

535. **The Panel notes that Management made efforts to try to consult with and solicit the participation of a wide range of stakeholders and beneficiaries involved in this complex project covering much of the country. Unfortunately, the people of southern Sindh, whose lives were already recognized as being affected by the Tidal Link, fell outside the field of vision of those who designed and appraised the project.** While it was the primary responsibility of the Borrower “to take the views of affected groups and local NGOs into account, the Task Manager ascertains the nature of the consultations undertaken with such groups and assesses the extent to

⁴³⁶ Review of the Performance of the Left Bank Outfall Drain Stage, 2005, p. 37.

⁴³⁷ Chotiari Reservoir (LBOD) and Tidal Link as part of NDP Project, Technical and Project Implementation Review, Back-to-Office Report, June 5, 1998, p. 10.

⁴³⁸ Technical and Project Implementation Review, 1985, p. 10.

which their views have been considered.”⁴³⁹ This was not done for the people of southern Badin.

- Project Implementation

536. Where AWBs and FOs were established, there seemed sufficient consultation with and even active participation of project beneficiaries. However, the establishment of AWBs and FOs, and the transfer of authority over irrigation and drainage to the PIDAs were well below initial Bank expectations, which meant that the total area actively covered by the project remained limited. Institutional reforms expected to enable greater consultation and participation with project beneficiaries were consistently delayed.⁴⁴⁰

537. **During ND Project implementation, Management insisted that the Borrower abide by the condition that the agreed-to institutional reforms first be implemented before physical works could be carried out.** Establishing the FOs and AWBs, and trying to make them reasonably effective participatory institutions in the face of apparent local, was itself a feat. **Within the boundaries of the pilot projects and the areas covered by effective FOs and AWBs, the NDP project complied with Bank policies that require consultation and participation**

- After the Disasters of 1998/1999 and 2003

538. After the collapse of a large section of the Cholri Weir in 1998, and the cyclone of the following year, the area near the Tidal Link and, to a lesser extent, the communities in that area, received much more attention. The collapse of the weir occurred after the close of the LBOD Stage 1 project, though signs of major problems with the structures were noted in 1996.

539. The Tidal Link and Cholri Weir had been turned over formally to the borrower, in this case the Government of Sindh (GoS). The GoS and WAPDA have since quarreled over who was responsible for the rehabilitation of the Tidal Link. The Province claimed that already damaged infrastructure had been handed over to it, while WAPDA claimed that legal “ownership” lay with the province. Despite several recommendations to involve local residents in environmental and social rehabilitation of the area, these programs do not appear to have been realized.

540. Management found that “[a]n important consequence of the failure to implement the LBOD EMMP is the lack of public awareness of the need to sustainably manage both the fishery and the eco-system of the dhands. Community mobilization and the creation of local mechanisms to sustainably manage the dhand ecosystem resources in collaboration with local authorities should be central element of renewed efforts to

⁴³⁹ OD 4.01, ¶ 8.

⁴⁴⁰ See, for example, Supervision Mission March 16 – March 25, 1998, Aide Memoire, April 9, 1998, p. 5; Social Development & Financial Management Thematic Review and Programming Mission: November 23 – December 10, 1998: Draft Aide-Memoire, n.d.; and National Drainage Program (NDP) Project: Joint World Bank, ADB, and JBIC Mid-Term Review (MTR) Mission, Draft Aide Memoire, Annex 4 and Annex 9, April 10, 2001.

*implement a revised LBOD EMMP.”*⁴⁴¹ **The Panel finds that an even more important consequence of this failure to implement the EMMP was an apparent lack of concern about the impacts of the structural failure of the Tidal Link on the local people at the tail end of the LBOD and KPOD, until the floods, death, and devastation of 2003.**

541. It is regrettable that it took over 100 deaths, the destruction of thousands of head of livestock, and the devastation of the livelihoods of thousands to reveal the gross social and economic inequalities in south Badin, the severe environmental and economic damages caused by the failure of the drainage infrastructure, and the lack of participation and consultation with the people in the affected areas. **While the Bank complied with policy provisions on consultation and participation, with regard to the direct irrigation beneficiaries under the NDP, it did not comply with them with regard to those adversely affected by the drainage systems investments under the LBOD and the NDP.**

2. Disclosure of Information

542. **Policies.** The policies concerning disclosure of information fall under BP 17.50 Disclosure of Operational Information (2002) and the 1994 version of the World Bank Policy on Disclosure of Information. The 2002 policy was in effect when the Request for Inspection was made. One of its objectives states as follows: “[T]imely dissemination of information to local groups affected by the projects and programs supported by the Bank, including nongovernmental organizations, is essential for the effective implementation and sustainability of projects.”⁴⁴² The InfoShop at the Bank Headquarters is the central contact for requests for disclosed documents, with access provided through Public Information Centers in member countries, including Pakistan.
543. The Panel observes that Bank policy on disclosure was not in place for most of the time of the LBOD project.
544. Bank policy on disclosure requires that most Bank documents be made available to the public upon request. This does not mean that Management distributes these documents widely or always free of charge. Those who want to obtain documents need to make their request to the Bank, either through the InfoShop at the Bank headquarters or through Public Information Centers, one of which is in Islamabad, or the Internet. Those requesting information must indicate the specific documents they would like. According to the disclosure policy approved in 1993, in the case of documents directly related to a country where a field office is located, those documents are provided free of charge to users in that country. In Washington, London, Paris, and Tokyo, a standard fee is charged. The Policy also identifies some constraints on making certain information available.
545. OD 4.01 sets forth the relevant policy for disclosure of the EA. It states that “[i]n order for meaningful consultations to take place between the borrower and affected groups and local NGOs, it is necessary that the borrower provide relevant information prior to consultations. **The information should be provided in a timely**

⁴⁴¹ Management Response, ¶ 33.

⁴⁴² The World Bank Policy on Disclosure of Information, June 2002, p 2.

*manner and in a form that is meaningful for, and accessible to, the groups being consulted. Such information normally includes (a) for the initial consultation, a summary of the project description and objectives, and potential adverse effects of the proposed project; and (b) once the EA report has been prepared, a summary of its conclusions in a form and language meaningful to the groups being consulted. Any consultation should pay particular attention to those issues most likely to affect the people being consulted. In addition, the borrower should make the EA report available at some public place accessible to affected groups and local NGOs for their review and comment.*⁴⁴³ [emphasis added]

546. **Field Visits and Documentation.** NDP Project documentation viewed disclosure as central to the Project. The Staff Appraisal Report states that “[a] high standard in favor of information disclosure would be applied for all project activities, including procurement, disbursements, EIAs, resettlement plans, Investment Project reports, and main covenants. All PAs [Participating Agencies], working with NGOs and other community groups, would subscribe to the project’s policy and standards in favor of a high degree of public participation and disclosure of project information to the public and stakeholders in particular.”⁴⁴⁴
547. The Requesters mentioned that several project documents they asked to review were available in the WAPDA offices, but that it was difficult for them to understand since the documents were all in English.
548. In contrast to the apparent lack of communication between the project and residents in the affected areas of Badin, an unscheduled visit by the Panel to the SIDA Transition Team offices in Hyderabad showed that under the NDP project there has been considerable contact between project staff and farmers in the areas where sub-projects have been implemented. The Panel also saw Sindhi language newsletters prepared by the SIDA Transition Team as part of their communications with Farmers Organizations and other project stakeholders.
549. Management’s Mid-Term Review found the disclosure of project documents, public communication, and participation insufficient. The MTR concluded that:

“Release of Documents of Public Interest: The Borrower, Provinces, and WAPDA would translate the Drainage Sector Environmental Assessment (DSEA), all EIAs of Investment Project, the FLAR, and all RAPs into local languages and make these available to the public through the Public Information Center and Library to be established by WAPDA and Provinces.

Public Information Center and Library (PICL): WAPDA’s Water Wing would establish and maintain a Public Information Center and Library (PICL) in Lahore, Regional Offices and other publicly accessible offices of WAPDA, PIDAs, and AWBs, which would be used as collection, storage, and dissemination centers for public information regarding the project, water resources development in Pakistan in general, and participatory irrigation and drainage management

⁴⁴³ OD 4.01, ¶ 21.

⁴⁴⁴ SAR (NDP), p. 34.

(PIM). All PICLs would be accessible/open to the public, particularly the academic community, PAs, NGOs, students, and the press.

Action Plan for Information, Public Communication, Education, and Participation: WAPDA and Provinces will implement a comprehensive Three Year Rolling Action Plan for Information, Public Communication, Education, and Participation, with the assistance of development communication and media professionals recruited under the project; and implement the program.”⁴⁴⁵

550. According to Management, only one briefing document on the project was translated into local languages. They could find no information on in-country disclosure of several key documents.⁴⁴⁶
551. **Assessment of Claims.** The Policy requirements to make the Project EA available, at a public place accessible to affected groups and local NGOs was not followed for the DSEA as the Environmental Assessment for the NDP Project. Given the subsequent environmental disasters attributed to the LBOD in south Badin, this exception is indeed unfortunate.
552. Management stated in its Response that “[w]ith respect to disclosure of the EA (...), the NDP project was not in compliance with BP 17.50, Disclosure of Operational Information, since the DSEA was not disclosed prior to appraisal at the Infoshop and no records of disclosure in country could be located.”⁴⁴⁷ **The Panel notes Management’s acknowledgement that the NDP project did not comply with BP 17.50 with respect to disclosure of the EA, since the 1993 DSEA was not disclosed in-country to affected stakeholders.**
553. The Panel observes that Management actively ensured that Project information was provided to farmer beneficiaries, but did not make the same efforts for other affected people in southern Sindh. **The Panel recognizes that information disclosure in the region involves significant logistical difficulties. At the same time, local people affected by the Project face major obstacles in gaining access to Project-related information that is of vital significance to them.**

⁴⁴⁵ Joint World Bank, ADB, and JBIC Mid-Term Review (MTR) Mission, Annex 9, “Simplification of NDP Action Plan and Procedures Post-MTR,” p. 9.

⁴⁴⁶ Management Response, Annex 1, Item 23, p. 31.

⁴⁴⁷ Management Response, ¶ 43.

Chapter 5: Supervision

A. Introduction

554. The Requesters claim that they have suffered substantial harm from the LBOD and the NDP projects. The Requesters raised concerns repeatedly with Management, and claim that Management did not take their concerns seriously. In this light, the Panel finds it appropriate to review whether Management and staff complied with OD 13.05 on Supervision. More specifically, the Panel will also review Management's supervision of and reaction to the failure of the Tidal Link and the Spinal Drain and the resulting impact on the population and environment of Southern Badin.
555. OD 13.05 states that project supervision is one of the Bank's most important activities.⁴⁴⁸ According to OD 13.05, the main purpose of supervision is to "(a) *ensure that the borrower implements the project with due diligence to achieve the agreed objectives and in conformity with the loan agreement; (b) to identify problems promptly as they arise during implementation and help the borrower resolve them (...)* (c) *to take timely action to cancel a project if its continuation is no longer justified, particularly if it can no longer be expected to achieve the desired development objectives.*"⁴⁴⁹ The Policy adds that adequate resources must be allocated to supervision and that the Regions should allocate resources "*commensurate with the nature, complexity, and the size of each project, with the problems experienced, and with the borrower's institutional capabilities and needs.*"⁴⁵⁰

B. Problem Identification and Corrective Measures

1. Estimation of Complexity of Technical Problems

556. As described in this Report, the LBOD and its Tidal Link have had significant effects on water flows and social and environmental conditions in southern Sindh. The failure of the Tidal Link structures has resulted in significant adverse consequences on people in these areas.
557. During the visit to the Project area the Panel witnessed numerous examples of poor work quality in these structures. This raises questions as to whether Management adequately identified problems as they arose in implementation, and initiated corrective measures as part of its supervision responsibilities in response to those problems.
558. For example, the Panel observed that decks of bridges over the KPOD were almost "paper-thin" (less than 8 cm thick) and had been constructed with very low quality concrete. Reinforcement bars had insufficient concrete coverage and were heavily eroding requiring complete reconstruction of the bridges after only ten years. Mortar in masonry was washed out leaving the brickwork exposed and crumbling. The standard

⁴⁴⁸ OD 13.05 (Project Supervision), ¶ 1.

⁴⁴⁹ OD 13.05, ¶ 1 (a)-(c)

⁴⁵⁰ OD 13.05, ¶ 4.

cement / aggregates ratio in concrete and mortar appears not to have been respected. The Panel expert pointed out that approach slabs and wings of bridges over the KPOD were not properly designed and could not withstand wave action and currents.

559. The Panel also inspected the remaining embankments of the Tidal Link.⁴⁵¹ The Panel expert considered them to be of flimsy construction.

2. Estimation of Environmental Risk

560. In light of its observations regarding the poor quality of construction, the Panel reviewed the history of Bank supervision of the construction process. Noting that construction started in 1988, the Panel observes that problems of construction were noted in supervision missions in December 1992 and June 1993 and in a letter to the Ministry of Water and Power in 1995.⁴⁵²
561. It was not until 1996, however, eight years after the beginning of construction, that these problems were elevated to the level of a major concern. It was only the Joint Donor Review Mission of March 1996 that finally prompted the Bank to request a monitoring program with monthly reports, and a comprehensive report at the end of the year.⁴⁵³
562. In November 1996, a Joint Review Mission (JRM) noted with alarm the continuing erosion of the Tidal Link embankments. It requested that an independent panel be established to investigate the cause and possible remedies of the problem.
563. The Panel found that there was no consistent follow-up on these recommendations. It appears that no action was taken on the matter until May 1998 when a Bank dam specialist visited the project and urged immediate action as the situation was deteriorating.⁴⁵⁴ When the Cholri Weir of the Tidal Link collapsed almost totally in 1999, the GoS established its own panel to investigate the problem. This was followed by a Fact-Finding Mission of the Bank in 2001.
564. At that time however, in 2001, it was too late to change the basic design of the project as the main structures were already in place. One indication of the serious nature of the design and construction problems might be seen in the refusal of the GoS, and more specifically SIDA, to take over the works from WAPDA. GoS claimed that the works were incomplete and not functional. The matter developed into a back-and-forth affair until finally SIDA accepted the works and on the promise that extra funds and resources would be made available for the repair.
565. As described in earlier Chapters of this Report, the failure of the Tidal Link had serious adverse consequences for people and the environment in southern Sindh. **The Panel recognizes the complexities of supervision and follow-up in a large-scale**

⁴⁵¹ As described elsewhere in this Report, most of the Tidal Link embankments were destroyed by the 1999 cyclone and the 2003 floods.

⁴⁵² This letter of the Bank to the Ministry of Water and Power, dated Feb. 16, 1995 raised concerns about the quality of the Borrower's consultants.

⁴⁵³ Joint Donor Review Mission, March 2-19, 1996, Aide Memoire, ¶4.2; (see also Chapter 2).

⁴⁵⁴ Technical and Project Implementation Review, Aide-Memoire, May 5, 1998.

multi-donor effort such as LBOD. The Panel finds, nevertheless, that the record of supervision indicates that one source of the problems with the Tidal Link was the failure to give sufficient attention to technical problems that arose during its construction.

a. Flooding

566. The people in southern Badin suffered major loss of life and harms from the floods in 2003. These impacts, initiated by the storms, were compounded by the problems with the Tidal Link structures and design elements of the spinal drain. (see Chapters 2 and 4).

567. The Panel did not find evidence that the dozens of deaths caused by flooding in the summer of 2003 were even mentioned in supervision documents.⁴⁵⁵ Further, the Panel did not see that the destruction of many houses caused by flooding in the summer of 2003 was taken up in supervision. As described elsewhere in this Report, the effects of the flood were compounded by problems of the LBOD and Tidal Link. **The Panel finds that the lack of response to the floods is not in compliance with OD 13.05.**

b. Environmental Problems related to Dhands

568. The Panel looked at how Management addressed the environmental issues identified earlier in this report. The Panel looked in particular at how problems related to the dhands and specifically the Ramsar sites and the issues related to the ecosystem were identified and followed-up in supervision.

569. The Panel notes that the damage to the dhands was not mentioned until the March 2001 Fact-Finding Mission, nearly three years after the Tidal Link failure. At this point, there was a substantial discussion on the value of the ecosystems, in the general case and in the case of the Ramsar sites.⁴⁵⁶ Damage from diurnal fluctuations from tides is mentioned specifically; increased salinity in the dhands is not mentioned.⁴⁵⁷ However, little more than the creation of an “*effective monitoring program*”⁴⁵⁸ and “*a core scientific group comprising multidisciplinary specialists*”⁴⁵⁹ to analyze this material are specifically recommended; these would eventually help “*define feasible and sustainable mitigation measures.*”⁴⁶⁰

570. The Aide Memoire later elaborated, listing as the “[t]wo priority actions (...) urgently needed to address the environmental risks?” the “*monitoring, surveys and studies initially outlined in the 1998 EMMP that are most relevant to the Tidal Link impact areas should be reviewed, updated and converted into a series of TORs and the*

⁴⁵⁵ Management was aware of the flooding; the Aide Memoire for the Implementation Review Mission in Sindh stated, “*Flood damages. SIDA and the Irrigation Department will prepare and [sic] assessment of the past extreme flooding events occurred in the last rainy season, in order to evaluate the possible local actions which could be implemented in the WSIP*” (Implementation Review: Sindh, Aide Memoire ¶ 10).

⁴⁵⁶ Fact-Finding Mission, March 2001: for the ecosystems generally, see ¶ 21; ¶ 27 on migratory birds and other species. For the Ramsar sites, see ¶ 30.

⁴⁵⁷ Fact-Finding Mission, March 2001, ¶ 37.

⁴⁵⁸ Fact-Finding Mission, March 2001, ¶ 21 and ¶ 38.

⁴⁵⁹ Fact-Finding Mission, March 2001, ¶ 44.

⁴⁶⁰ Fact-Finding Mission, March 2001, ¶ 21.

*revised program launched on an urgent basis” and the establishment of “a clear and stable institutional framework for the management and coordination of the program” by the Government of Sindh.*⁴⁶¹ The unfinished parts of the EMMP were not specified. The Panel is not aware that deadlines were set.

571. The Panel’s review of supervision documents did not show any evidence that Management followed-up consistently with respect to data collection on environmental harms to the dhands. The only other mentions of these environmental issues in supervision documents that the Panel notes are from December 2004, shortly after the Request to the Panel, which noted that “*sea intrusion has rendered traditional fishing lakes and ponds unusable and damage to wetlands and the mangrove forest is extensive.*”⁴⁶²
572. The Panel observes that Management’s attention to the dhands has been sporadic, taking nearly three years from the failure of the tidal link to even mention the environmental damage. When it was finally mentioned in the Fact-Finding Mission, recommendations were focused on data collection. There was no follow-up again until December 2004, when a Diagnostic Study was planned.
573. Furthermore, the Panel notes that although the December 2004 Final Implementation Review Mission mentions “*decreased availability of drinking water,*”⁴⁶³ Management supervision documents make no mention of problems regarding the increasing salinity of groundwater cited by the Requesters.

c. Salinity of Agricultural Land in Southern Badin

574. The Panel did not find evidence that the increasing salinity of agricultural land in the areas bordering the KPOD was pointed out until December 2004, in which the Back to Office Report for the Diagnostic Study Mission noted that “[s]aline sea intrusion has intensified, taking more agricultural land out of production.”⁴⁶⁴

d. Impact on Fisheries

575. Management’s attention to fisheries has been sporadic. The impact on fisheries was not mentioned until the March 2001 Fact-Finding Mission.⁴⁶⁵ The BTO for the Mission mentioned as “[t]he first major risk” that the failure of the Tidal Link would lead to “*substantial and irreversible damage to the ecosystem, habitat and fishery in the Dhands.*”⁴⁶⁶ When it was finally mentioned in the Fact-Finding Mission, no adequate recommendations were made. There was no follow-up until after the Request, when a Diagnostic Study was planned in December 2004.
576. In its BTO for the Diagnostic Study Mission in December 2004, Management noted that “*sea intrusion has rendered traditional fishing lakes and ponds unusable and*

⁴⁶¹ Fact-Finding Mission, March 2001, ¶ 45.

⁴⁶² Diagnostic Study Mission, Back to Office Report, p. 1.

⁴⁶³ Final Implementation Review Mission, Aide Memoire, ¶ E 12.

⁴⁶⁴ Diagnostic Study Mission, Back to Office Report, p. 1.

⁴⁶⁵ Fact-Finding Mission, March 2001, ¶ 37.

⁴⁶⁶ Fact-Finding Mission, March 2001, ¶ 37.

*damage to wetlands and the mangrove forest is extensive.*⁴⁶⁷ Likewise, the December 2004 Final Implementation Review noted that “[t]he coastal areas of Badin are facing a multitude of environmental and social issues, the most alarming of which are the intrusion of sea, loss of fish spawning ground and loss of...fish productivity.”⁴⁶⁸ The latter noted that initial findings for the Diagnostic Study were that the changes in the “environmental conditions in the area are visible and extreme and not related to NDP interventions.”⁴⁶⁹ The Panel is not aware that concrete corrective actions were planned.

3. Concern for Project-Affected Populations

577. The Panel observes that the Management Response to the failure of the weir and embankments dealt mainly with technical aspects, and neglected the social dimensions of these failures. As mentioned above, the 2001 Fact-Finding Mission focused on technical and environmental issues and dealt only marginally with the social consequences and the effects on the livelihoods of the affected people. In addition, even with respect to social and environmental issues noted in the Fact-Finding Mission, the Panel found very little in the way of supervision follow-up. As discussed in more detail below, neither the Tidal Link nor the people harmed by its failure were directly mentioned in the supervision documents reviewed by the Panel from the time of the Fact-Finding Mission to the time of the Request—a period of three-and-a-half years.⁴⁷⁰

578. The Panel notes that Project authorities and Management based their decision-making on insufficient information about the population that was affected by the irrigation and drainage structures and not engaged in agriculture. The Fact-Finding Mission estimated the number of affected people in the area near the Tidal Link and the dhands. It indicated that there were thirty small affected fishing villages, totaling about 5,000 to 6,000 people, all of whom, according to the Fact-Finding Mission, lived there temporarily, with the exception of one village with 250-300 ‘huts.’⁴⁷¹ In comparison, the Diagnostic Study conducted on a larger area in April 2005, after the Request was made, concluded that 1.2 million people lived in coastal areas. This study did not consider them as temporary residents.⁴⁷² In 2005, the IPoE estimated the coastal population of Badin to be 520,000. Again, the people were not considered to be temporary residents.

579. Accordingly, in addition to an analysis of Management supervision over time, the Panel considers it useful to look at supervision specifically of the environmental and

⁴⁶⁷ Diagnostic Study Mission, Back to Office Report, p. 1.

⁴⁶⁸ Final Implementation Review Mission, February 2005, Aide Memoire, ¶ E 12.

⁴⁶⁹ Final Implementation Review Mission, February 2005, Aide Memoire, ¶ E 12.

⁴⁷⁰ The following reports made no mention of the Tidal Link at all: Mid-Term Review Mission on October 30 - November 15, 2002, dated November 15, 2002; Implementation Review Mission on May 11 - June 13, 2003; BTO for Implementation Review Mission (Procurement) on November 29 - December 6, 2003, dated December 15, 2003; Sindh Aide Memoire for Implementation Review Mission on March 28 - April 7, 2004, dated April 29, 2004; and Back to Office Report for Implementation Review Mission on June 26 - July 4, 2004, dated June 30, 2004.

⁴⁷¹ Fact-Finding Mission, March 2001, p. 7-8.

⁴⁷² Diagnostic Study, 2005, p. i. “The current combined population of the districts of Thatta and Badin is estimated to be around 2.26 million (...) Overall, about 1.2 million people or 44% of the population of the two districts live in the coastal Talukas. In terms of households, this would mean about 175,000 to 200,000 households depending upon the size of the household.”

social issues that are addressed earlier in this report. The Panel notes that there are difficulties in providing a break-down of issues facing the local people that were addressed by Management in supervision because supervision documents tend to focus instead on general developments. However, the Panel analyzed whether the Bank had identified and adequately followed up on the specific issues emanating from the Request, described below.

580. From late 1998 until the Panel received the Request in September 2004, Management's supervision reports demonstrate inadequate concern for the socio-economic damage to the people in Badin and Thatta which resulted from the Tidal Link's failure, with the exception of the March 2001 Fact-Finding Mission. However, even the Fact-Finding Mission made few recommendations to directly help those affected. Unfortunately, those recommendations that were in the report were not followed-up in subsequent supervision work.

581. **The Panel finds that Management did not adequately identify and take adequate corrective actions with regard to the negative environmental and social impacts of the Projects. This does not comply with OD 13.05.**

C. Supervision Missions

1. Supervision Missions during LBOD

582. The LBOD Implementation Completion Report (ICR) gives details on the resources allocated to supervision.⁴⁷³ Overall a total of 704 staff weeks or US\$1.887 million were spent. Twenty three missions have been launched during the 12 years implementation period, about one mission every six months. At face value this level seems to be adequate for a project of this size and complexity. More detailed analysis of the composition of the missions and the problems encountered reveals, however, considerable imbalances.

583. The Panel expert found that during the critical design and construction period from 1988 to 1994, the LBOD project was guided only by irrigation engineers who supervised all technical aspects of the Project, occasionally supported by other specific engineering expertise.⁴⁷⁴ In the view of the Panel, this may have been sufficient for the review of the upstream drainage works but was not adequate for the review of the design aspects of the outfall system or the environmental and social impact of the project. The design aspects of the outfall system would have required specific expertise in coastal morphology and coastal engineering, while the environmental and social impact of the project would have required expertise in environmental and social sciences.

584. More specifically, the first water resource engineer was brought in only in December 1996, the first environmental specialist also in December 1996.⁴⁷⁵ In 1998, a dam specialist visited the project and wrote a critical report on the technical aspects of the

⁴⁷³ ICR (LBOD), pp. 46, 47, Tables 12 and 13.

⁴⁷⁴ ICR (LBOD), pp. 47, 48, Table 13, according to which between one and three irrigation engineers supervised the Project in this period.

⁴⁷⁵ ICR (LBOD), p. 48, Table 13.

Tidal Link.⁴⁷⁶ Irrigation engineers are rarely specialists in coastal engineering and coastal morphology. Overall, environmental specialists were almost absent during LBOD design and constructions.

585. The Implementation Completion Report (ICR) of the LBOD correctly recognizes the Project's *"insufficient emphasis on social, financial, communication and environmental aspects which however were consistent with the prevailing practice and the body of knowledge then applicable to such development projects."*⁴⁷⁷ Beyond this, the Panel is of the opinion that Management failed to supervise adequately the *technical* aspects of Project during implementation, in particular relating to the Tidal Link and its embankments.
586. Competent technical supervision by the Bank, including specialized expertise, would have identified emerging problems and initiated appropriate action. This could have helped to avoid the many troubles and suffering of the local population linked to the failure of the Tidal Link structures. **The Panel observes that Management failed to assign the appropriate expertise for the supervision of technical aspects of the design and construction work under the Project. As a result, Management failed to identify serious flaws in the design and implementation of the Project, and to initiate corrective measures in a timely manner. This does not comply with OD 13.05.**

2. Supervision Missions during NDP Project

587. The NDP Project addresses drainage issues at the national level. However, the Project strategy and the envisaged investment components hinged to a large extent on the functioning of the LBOD structures put in place under the preceding LBOD Project. Recognizing NDP's focus on institutional and policy changes, Management had a responsibility to supervise the NDP Project in its totality and to pay adequate attention to the evolution of drainage issues in the Southern Sindh area, including issues arising from the collapse of some of the LBOD structures funded under the preceding project.
588. The Requesters claim that their concerns were not properly dealt with by Management, including during Project supervision. The Panel, therefore, examined the supervision missions, assessing their expertise and composition, their quality, and their identification and response to problems.
589. The Panel reviewed Management's supervision documents to assess Bank's treatment of the failure of the Tidal Link and its embankments. Since substantial investment in the Tidal Link and Spinal Drain was explicitly a part of the NDP Project, the Panel regards supervision of the consequences of the Tidal Link's failure as part of Management's responsibilities. In particular, the Panel sought to answer two questions in reviewing Management's supervision:
- Did Management adequately respond to the failure of the Tidal Link weir and, subsequently, the Tidal Link embankments?

⁴⁷⁶ Technical and Project Implementation Review, Back to Office Report, June 5, 1998.

⁴⁷⁷ ICR (LBOD) ¶ 36.

- Did Management adequately identify and respond to the harm caused to the people and the environment of Badin and Thatta linked to these structural problems?

a. Supervision before Failure of Tidal Link

590. As mentioned previously, Management was aware of structural problems of the Tidal Link in 1996. The Back to Office (BTO) report of June 1998, shortly before the weir collapsed, noted that “*sections of both channel and embankments have been subject to erosion*” in areas of concern.⁴⁷⁸ Nevertheless, noting the termination of the IDA credit for the LBOD, Management claimed that “[t]he Tidal Link operation is apparently WAPDA and GOS’s O&M problem and should rather be handled accordingly instead of the Bank getting into it.”⁴⁷⁹ (sic)

591. Still, the Bank discussed with WAPDA several remedial measures, including financing under NDP, the appointment of an International Panel of Experts, and the development of a long-term solution that involved local actors.⁴⁸⁰ The mission noted that the “*requirements ... do not appear to have been met so far*” and that they were not heading toward “*being met in the immediate near future.*”⁴⁸¹ Management did not add what it intended to do about the inaction. **Despite recognition of the problems and attempts to find a solution, Management did not succeed in adequately addressing problems regarding the Tidal Link before its failure.**

b. Response to Failure of Tidal Link

592. In the Panel’s opinion, the reaction to the failure of the Tidal Link was timid. Perhaps a timely, more forceful intervention could have saved the weir and the dhands. The lack of a provision for emergency closure of the Tidal Link made it difficult to control the tidal flow through the breach. The Bank expressed its concern to WAPDA and urged immediate measures and offered assistance from NDP funds. Upon receipt of a reassuring response from WAPDA, little happened until the cyclone hit in the following year and destroyed the remains of the weir and the embankments.

593. While the GoP and the GoS convened several meetings and established high-level commissions to study the causes and agree on remedial action, the Panel observes that Management remained passive. Documents available to the Panel contain no hint, other than the letter mentioned above, that the matter was of concern to Management. Bank staff in Lahore must have been aware of the failure of the Tidal Link and the grave consequences to the local population. The lack of response is difficult to understand because the Tidal Link was the critical element of the national drainage strategy that was built on an integrated drainage system with outfall to the sea. The pre-feasibility study on NSDS, then to be financed by the Bank under the NDP, mentioned some problems of the Tidal Link but assumed that the structure would be repaired.

⁴⁷⁸ Technical and Project Implementation Review, Back to Office Report, p. 9.

⁴⁷⁹ Technical and Project Implementation Review, Back to Office Report, p. 9.

⁴⁸⁰ Technical and Project Implementation Review, Back to Office Report, pp. 9, 10.

⁴⁸¹ Technical and Project Implementation Review, Back to Office Report, p. 10.

594. The pattern of appropriate initiatives and weak follow-up continued. An Environmental Management and Monitoring Plan (EMMP) was initiated and a proposal developed by the LBOD consultants for ADB funding. Development and implementation of the EMMP was hampered by disagreements on the TORs and other issues between the GoP and the GoS. Apart from hydrographic monitoring of the Tidal Link by the National Institute of Oceanography (NIO) and water table and salinity monitoring by WAPDA's SCARP Monitoring Organization (SMO) no ecological monitoring, analysis and management of the situation in the area took place.⁴⁸²
595. The Aide Memoire for the Second NDP Project Supervision Mission, in August 1998, noted concern about the recent failure of the Tidal Link and its Cholri Weir and included several agreed actions.⁴⁸³ These actions included carrying out emergency stabilization and repairs on the Tidal Link, activating the PoE for the Tidal Link, and seeking "*amicable resolution of responsibility for failure of Tidal Link/Makhi Weir (i.e. avoid litigation) with LBOD Consultants.*"⁴⁸⁴ The Aide Memoire did not mention the effects on local affected people or how to mitigate those harms.
596. A subsequent "Social Development & Financial Management Thematic Review and Programming Mission" in November – December 1998 focused on uses of irrigation water, but did not deal with the Tidal Link.⁴⁸⁵ The Aide Memoire for the third supervision visit in February - March 1999, mentions the Tidal Link only to say that despite "*GOS's request for IDA to finance*" rehabilitation of the Tidal Link among other structures, IDA "*has come to the conclusion that it is not advisable at this stage.*"⁴⁸⁶
597. The Aide Memoire from the next mission, in May – June 1999, made no mention of the Tidal Link at all, despite the heavy damage to the Cholri Weir due to cyclones. Instead, the mission noted in its accompanying letter that Management was "*pleased to note the continued good progress of the Project.*"⁴⁸⁷ The Aide Memoire for the Fifth Supervision/Mid-Term Review Mission in February - April, 2000, again noted the GoS request for funding for the Tidal Link and the Bank's unwillingness to fund this; the Bank did commit to a Fact-Finding Mission though.
598. In March 2001, nearly three years after the heavy damage to the Cholri Weir in 1999, the Bank fielded a Fact-Finding Mission to the site to investigate the causes and the process of the failure, the possible technical, environmental and social consequences and to suggest to the GoS the next steps to be taken. As noted in Chapter 2 of this Report, the Mission considered it justified not to attempt to repair the weir because the damage was beyond repair by conventional methods, and because the scour and erosion were still active, rendering any repair attempts useless. The Mission produced

⁴⁸² Management Response, ¶ 32. See also Chapter 3 of this Report.

⁴⁸³ Second IDA Supervision Site Visit August 3 - 18, 1998, Aide Memoire, September 14, 1998.

⁴⁸⁴ Second Supervision Site Visit, Aide Memoire, Attachment 1.

⁴⁸⁵ Back to Office Report: National Drainage Program Project (Cr.2999-PAK) Social Development & Financial Management Thematic Review and Programming Mission November 21-December 12, 1998, January 14, 1999.

⁴⁸⁶ Third IDA Supervision Site Visit: February 22 - March 4, 1999 Aide Memoire, p. 2.

⁴⁸⁷ World Bank Letter to Government of Pakistan, Pakistan: NDP (Cr.2999-PAK): Fourth IDA Supervision Site Visit (May 17-June 24, 1999, July 19, 1999, p.1.

a report,⁴⁸⁸ which deals with many of the issues and problems that eventually surfaced in the Request to the Inspection Panel. However, this report is reluctant to name the underlying reasons for the failure such as: design errors, lack of supervision, and quality control.

599. A serious weakness of the 2001 report is that it mainly addresses technical and some environmental issues, but is rather silent about the social consequences and the effects on the livelihood of local people. The resulting recommendations are limited to a monitoring program for hydrological data and institution issues but do not include an aggressive, forward looking strategy on how to mitigate the damage and reestablish the livelihood of affected people. Management had the possibility to use funds of NDP to finance an emergency response (see Chapter 4). Instead, discussions on the causes and consequences of the failure were linked to technical and construction issues. No attention was given to the plight of the population.
600. **The Panel finds that from late 1998 until the time that the Panel received the Request in September 2004, Management's supervision reports demonstrate only sporadic concern for the physical damage to the Tidal Link.**
601. The Panel noted several other instances in which the Bank failed to adequately respond to signals of warnings, e.g. with regard to the Chotiari Reservoir. As stated earlier in this report, a Bank Irrigation Adviser in June 1998 reported that the reservoir had been unprofessionally designed by inexperienced consultants, few of whom had ever visited the site, but the warning was not heeded by Management.
602. Management reacted with a completely different attitude to the problems caused by the collapse of the Tidal Link once the local population had addressed themselves to the Inspection Panel and requested an inspection. In December 2004, Management initiated a Diagnostic Study on improvements in livelihoods in the Badin and Thatta Districts, making an extensive visit to the area.⁴⁸⁹ The Aide Memoire for the December 2004 Final Implementation Review Mission noted that “[t]he present problems are a clear indication of the need of a new approach.”⁴⁹⁰
603. Management also noted the many problems facing those harmed by the Tidal Link's collapse, adding that it had initiated a Diagnostic Study.⁴⁹¹ The report was published in February 2005. This was followed in April 2005 by a full scale mission to design a rural development project for the area. **The Panel is pleased to note that, after the Request, Management has given considerably more attention to the problems of the people in Badin and Thatta affected by the Tidal Link's collapse. The Panel acknowledges these activities, but notes that they began nearly six-and-a-half years after PAPs began suffering from the failure of the Tidal Link.**

⁴⁸⁸ Fact-Finding Mission, March 2001.

⁴⁸⁹ Diagnostics Study of the Coastal Area of Sindh, Back to Office Report on December 1 - 10, 2004, p. 1.

⁴⁹⁰ Final Implementation Review Mission, February 2005, Aide Memoire, p. 6. The Aide Memoire states, “*In the POE review of the DMP, the Kotri basin was selected to carry out a stakeholders' consultation and used the DRAINFRAME methodology with strong social participation and a consensual agreement in the proposed actions and physical interventions. This process is planned to be followed up during the implementation of the WSIP (2005-2010)*” (p. 6).

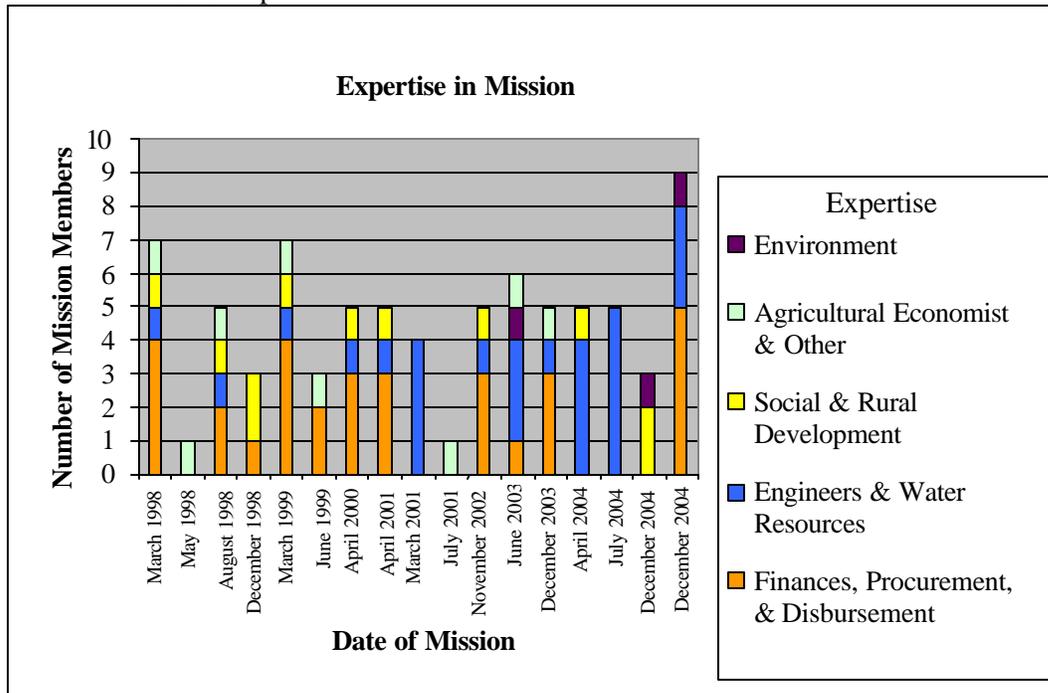
⁴⁹¹ Final Implementation Review Mission, February 2005, Aide Memoire, pp. 24-25.

604. It is also noteworthy that the Request to the Panel and the ensuing discussions between Management and the Borrower accelerated the development of a new drainage concept that took into consideration one of the Requesters' key complaints. Thus, in the resulting Drainage Master Plan, Pakistan's drainage strategy is no longer seen as being dependent on the northward extension of the LBOD.
605. **The Panel finds that the lack of response to the failure of the Tidal Link does not comply with OD 13.05 on Supervision. In the Panel's opinion, the NDP Project inherited the task to look after the Tidal Link because remaining work of LBOD, including the Tidal Link in particular, was being implemented under the NDP Project, and there would have been the possibility of using NDP funds for mitigation purposes. Speedy implementation of an environmental management and mitigating program that addressed the concerns of the local population would have reinstated confidence and avoided much of the current hardship.**

c. Mission Expertise

606. The Panel assessed the extent to which missions had the relevant expertise required to deal with issues pertaining to the Requesters. Of the twelve missions listed in Management Response and the two missions since then in late 2004, most contained some social development/rural development expertise. However, the focus of this expertise was on populations involved in irrigated agriculture and excluded concerns for populations that were negatively affected by the configuration of the overall irrigation and drainage system, such as the population in southern Badin. The Panel also found that only three missions had environmental experts, and those were the missions subsequent to the Request.
607. As mentioned above, the Panel notes that at the time of the Panel visit in May 2005, the Bank's Islamabad office still had no environmental staff and that Bank environmental specialists had been only marginally involved during LBOD design and construction. Hence, environmental warning signs went unheeded. Supervision during the NDP showed little improvement over that for the LBOD project in this regard. Occasionally a technical specialist from Bank Headquarters doubled as an environmental officer, but environmental inputs remained weak and sporadic and became significant only during the final stage of the NDP Project.

Table 6: Composition of Missions



Source: Panel Analysis of Bank Supervision Documents

Definition of categories: 1) Environment; 2) Agricultural Economist & Other: Agricultural Economist, Agriculturalist, Project Analyst, Operations Analyst, Institutional Development, Administrative Client Support, Dams, Lawyer; 3) Social & Rural Development: Social Development, Rural Development, Resettlement Engineer, NGOs; 4) Engineers & Water Resources: Irrigation Engineer, Water Resources, Drainage Advisor; 5) Finances, Procurement, & Disbursement: Financial/Economics, Procurement, Disbursement.

d. Contact with Affected Populations in Southern Badin

608. As part of effective supervision, it is important to visit the affected area and consult with affected people about issues and problems that might be arising under the Project. These contacts and consultations will help to reveal and solve problems relating to such projects, and thus assist in implementing the provisions of Bank Supervision policy calling upon the Bank to “*identify problems promptly as they arise during implementation.*”⁴⁹² In this context, the Panel reviewed supervision documents for evidence regarding whether Bank staff visited the site of Tidal Link failure, and whether Project personnel consulted with the local population as the problems began to arise.

609. According to the documents reviewed by the Panel, it took Management nearly three years after the Tidal Link’s failure to visit the site of the Tidal Link, during the March

⁴⁹² OD 13.05, ¶ 1(b).

2001 Fact-Finding Mission.⁴⁹³ Bank staff again visited the site in December 2004, shortly after the Request to the Panel.

610. In addition, despite the March 2001 Fact-Finding Mission,⁴⁹⁴ the Panel found only sporadic evidence that Management interacted with the affected population for the five-and-a-half year period after the failure of the Tidal Link and up to the time of the Request to the Inspection Panel in December 2004.⁴⁹⁵ At that point, beginning in December 2004, Management attempted to ascertain the harm done to PAPs.
611. The Panel did not find evidence that project affected people were adequately consulted or mentioned in supervision documents during the most crucial time of the NDP Project. **The Panel finds that Management was slow to visit the site of the Tidal Link failure, and did not have a consistent approach to interacting with the local population to understand and address the social and environmental implications of this failure. Management's failure to consult with downstream affected people for over half a decade following the breaches in the Tidal Link is of great concern to the Panel. This does not comply with OD 13.05.**

D. Transparency and Reporting to the Board of Directors

612. Given the serious problems in the technical performance of the outfall system and the subsequent failure of key structures, the Panel reviewed (Back to Office) BTO reports and related Aide Memoirs conducted between 1994 and 1998. The Panel then compared them with statements included in the ICR submitted to the Board of Executive Directors.
613. The Panel noted that the BTO reports prior to 1995 contain nothing on the issue of increasing erosion of the embankments of the Tidal Link. Starting in 1996 the Aide Memoirs became increasingly critical about the design and the performance of the Consultants. The JRM of November 1996 demanded the establishment of an independent panel to review the design and causes for the severe erosion problems.
614. The JRM of 1997 discussed the issue of Tidal Link erosion again, and reviewed the report of the consultants. Emergency measures to stop the erosion and implement remedial measures were not successful. In spring of 1998, a dam specialist visited the project and wrote a critical report on the situation that should have alarmed Management. Surprisingly, the ICR report was prepared at about this same time but contained practically no mention of the serious technical difficulties.

⁴⁹³ The resulting Technical Note and Recommendations states that the mission visited the site of the collapse and met with various representatives in Karachi and Hyderabad. However, the Note does not mention that it made site visits to the locations of affected people.

⁴⁹⁴ PAPs were not consulted despite the Mission's objective of, *inter alia*, understanding the "environmental and social consequences" of the Tidal Link's failure and suggesting "to the Government of Sindh further steps to be taken" (Fact-Finding Mission, March 2001, p. 2).

⁴⁹⁵ Diagnostic Study Mission, Back to Office Report, p. 1, "[T]he mission undertook and extensive visit of the coastal areas of the Badin, Thatta and Karachi Districts and interacted with communities, with NGOs that have programs in these areas and with government officials, and in order to acquire an understanding of the situation."

615. Although the problems of the tidal link were a major issue during the final years of Bank involvement in the Project, the ICR addresses these concerns only in passing (p. 12 and Appendix A of the ICR). This final report presents a much more optimistic picture of the situation on the ground than the preceding mission reports. It is also less candid than the Aide Memoires reporting on discussions with the borrower.
616. The ICR's chapter on sustainability addresses institutional arrangements, beneficiary participation, funding arrangements, plan for O&M, and sector policies. However, the paragraph on risk is silent about the situation of the Tidal Link and, as in all other reports and supporting documents, there is no mention of the social dimensions of the failing structures.
617. **The Cholri Weir collapsed only one week after the publication of the Implementation Completion Report. This started the unraveling of the outfall system. The Panel is concerned that the Implementation Completion Report that was circulated to the Board was insufficiently transparent on important shortcomings of the project. The Panel cannot explain why Management's internal checks and balances did not detect the discrepancies between the final report and supervision reports, and why the final ICR was not amended once it was shown to have been misleading in its assessment of the Project's outcomes.**
618. Only the Report of the 2001 Fact-Finding Mission, written three years after the ICR, accurately identified the many and widespread problems in the implementation and performance of the project, although it falls short of identifying the underlying causes.

E. Conclusions

619. The Panel's investigation found that the Project design, appraisal, and supervision process focused on the direct beneficiaries of irrigation water and improved drainage. **Down-stream effects, including those on the local populations of southern Badin, did not feature in any significant way either in the design or supervision of the Project.** There was also a failure to develop a complete systems view early in the NDP Project as reflected by the restricted focus of the Project and the EA. This hampered the Borrower's and the Bank's ability to assess impacts, consider alternatives, and develop mitigation measures for the Project-affected areas in Southern Sindh in line with Bank policies. The absence of proper feedback mechanisms within Management prevented social problems that were detected from being elevated with the necessary urgency and recommendations for action. To a very large degree, the damages suffered by people in the project-affected areas, as described in this Report, have not yet been redressed.
620. **The Panel notes that the Bank has recently become engaged in preparing a Sindh Coastal Areas Development Program. If carried out successfully, this has the potential to bring some form of support to the areas and people affected by the events described in this Report.**
621. **The Panel also appreciates recent initial actions by the Government to address the structural problems causing harms to the affected population. The Panel**

notes the importance of implementing effectively actions addressing the needs of the affected populations.

Annex A: Table of Findings

ISSUE	MANAGEMENT RESPONSE	PANEL'S FINDINGS
Background and Context: Irrigation, Drainage and Conditions in Southern Sindh		
Relationship Between LBOD and NDP	All works under LBOD Stage I were completed except certain contracts pertaining to the remodeling of the Nara Canal, commissioning of the Jamrao Canal and some electrification works, which were carried over to the IDA-financed portion of the NDP project	LBOD <i>project</i> closed in 1997, but completion of LBOD <i>system</i> and Chotiari Reservoir were carried forward into NDP Project. Analysis of compliance and harm relating to NDP Project requires consideration of inter-related elements of LBOD system and, as relevant to present circumstances, Chotiari Reservoir. Project included task of completing LBOD system, and has advanced proposals to expand it significantly. This work depended on functioning of LBOD Tidal Link. As a result, Project inherited related task of responding to environmental and social implications of breakdowns in LBOD Tidal Link that have occurred during the course of the Project.
Northward Extension of LBOD	The LBOD Stage 1 Project was closed in 1997 and NDP will not extend the LBOD Spinal Drain further north. Although the NDP project as originally conceived in the 1997 Staff Appraisal Report (SAR) was to have laid the groundwork for the NSDS, the concept was subsequently rejected as a result of extensive studies and reviews.	Panel notes important development that NDP Project did not implement NSDS and did not extend LBOD Spinal Drain any further north. Final DMP proposes regionalized solutions to drainage management, and makes little reference to northward extension of LBOD along the lines of TBOD (proposed in draft) or NSDS. Panel understands this means such structures are no longer planned. Panel noted, however, certain ambiguities in DMP text on this issue, and seeks clarification in light of concerns of Requesters.
Project History, Design and Impacts – LBOD Design and Performance		
Alternative Alignments of the Outfall Tidal Link	Carrying the LBOD drainage, consisting of base flow and storm water, across the coastal zone to the Arabian Sea was considered important for several reasons. First, the drainage outflow from the system could not be emptied into the Shakoor Dhand and Rann of Kutch because these are international wetlands shared by India and Pakistan. Second, while the salinity of the drainage outflow is quite	Selected alignment was politically attractive because it minimized discharge of water across international boundary, but it was technically and environmentally risky.

	<p>moderate compared to the Rann of Kutch, it was likely to contain a number of agricultural chemicals, nutrients, and industrial and domestic pollutants, and hence could not simply be disposed of in such a valuable wetland without possible risk to its important environmental values. Third, it was believed at the time that a sustainable direct outlet to the sea would need to be developed.</p>	
Design Criteria	<p>The adopted scheme for disposal of effluents included: (a) completion of the Spinal Drain; (b) remodeling of the Kadhan Pateji Outfall Drain (KPOD) and the Dhoro Puran Outfall Drain (DPOD); and (c) a 26-mile Tidal Link canal, running from northeast to southwest across the Rann of Kutch and connecting KPOD to an active tidal creek, Shah Samando Creek.</p>	<p>Designers did not evaluate the likelihood that under prevailing meteorological conditions, high surface water run-off from upstream areas would coincide with high water levels in the Arabian Sea.</p> <p>The design assumption that people in region would not release water from inundated lands failed during July 2003 rainfall. The Panel finds that the main drain should have been designed with a higher safety margin.</p>
Analysis of the Technical Design		
<p>Hydraulic modeling load assumptions</p> <p>Embankments and Cholri Weir</p>	<p>In June 1998, undermining and erosion caused a 250 foot section of the weir to collapse. Many attempts were made to close the breached weir section, but all failed due to monsoon weather and the remoteness of the site. At the end of October 1998 the federal and provincial authorities and the consultants who visited the breach site jointly decided to stop further remedial works after the length of the breach in the weir had increased to 450 feet from the southern end. On May 21, 1999 a catastrophic tropical cyclone hit the Tidal Link area causing severe damage, which included the near total destruction of the Cholri Weir, and further breaches of both sides of the Tidal Link embankment in 56 places.</p>	<p>Significant technical mistakes were made during design of Tidal Link embankments and Cholri Weir.</p>
Control Structures	<p>Issue not raised.</p>	<p>LBOD designers underestimated the risk of extreme meteorological events and made insufficient arrangements to deal with their intensity.</p>
Meteorological Risk		
Risk Assessment		<p>Tidal Link structures were critical to performance of system but design had</p>

		substantial inherent risks. Design and construction went ahead without adequate provision to minimize the risk that the structures would give way and to mitigate possible harm.
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Performance of the LBOD

Development Objectives	A principal objective of the LBOD Stage 1 Project was to address the Indus Basin’s drainage problems.	Underestimation of risk and lack of appropriate technical measures to reduce risk and mitigate adverse impact led to situation where people in lower Badin area are suffering from consequences of project.
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Performance of Structures, including Cholri Weir	Almost as soon as the Tidal Link began operating in June 1995 it experienced significant erosion and scour problems. In June 1998, undermining and erosion caused a 250 foot section of the weir to collapse. Many attempts were made to close the breached weir section, but all failed due to monsoon weather and the remoteness of the site. At the end of October 1998 the federal and provincial authorities and the consultants who visited the breach site jointly decided to stop further remedial works after the length of the breach in the weir had increased to 450 feet from the southern end. On May 21, 1999 a catastrophic tropical cyclone hit the Tidal Link area causing severe damage, which included the near total destruction of the Cholri Weir, and further breaches of both sides of the Tidal Link embankment in 56 places. Since the collapse of the weir and the cyclone breaches in the embankment, the water and salinity balance of the Tidal Link and the dhands have changed. The Tidal Link flow is no longer confined; instead, it is now intermingled with the flow to and from the dhands and the Rann of Kutch at every tide cycle.	Design of the LBOD outfall system was not in harmony with the winds and natural flow of water and that, even while structures were still holding, gradual changes to ecosystem occurred. LBOD system combined with partial destruction of Tidal Link has heightened risks to local people from storm-water as well as from sea-water flooding. Situation is particularly bad when heavy rainfall inland and high tides and storm at sea coincide. The 2003 floods led to loss of many lives.
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NDP Project Components and Implementation

Environmental Compliance - Environmental Assessment OD 4.01

Project Area of Influence	Issue not raised.	Under NDP Project neither potential environmental nor potential social impacts of Project in area of concern to Requesters were considered in a meaningful way until submission of
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		<p>Request.</p> <p>By comparison, environmental and to some extent social issues relevant to area of Request were given consideration under the LBOD project during the design and implementation of Tidal Link. However, once system began to break down, Management focused on technical problems (e.g., the erosion of the Tidal Link channel bed and embankments) but did not succeed in bringing necessary attention to social impact of failing structures.</p>
<p>Environmental Screening and Level of Analysis</p>	<p>Environmental Data Sheets were prepared in April 1993, May 1995 and March 1997. In each case, the project was designated as Category B under OD 4.01.</p> <p>During the 1990s, the Asia environment department (combining what are now the East and South Asia environment units) of the Bank placed some relatively large projects in Category B (“the big Bs”).</p> <p>Thus, a Category B for the NDP project was consistent with the Region’s practice at the time—it had potential environmental benefits and the investments were individually small- to medium-sized subprojects that had not yet been designed but would be subject to environmental and social screening. Management acknowledges that it would have been more appropriate to categorize this as an EA Category “A” project.</p> <p>This practice of “big B” categorization has ceased.</p>	<p>Further development of LBOD was intended to improve drainage but had and has potential to intensify significantly harms to people and environment generated by the existing system, especially in southern Sindh.</p> <p>NDP was designed to lay foundation for long-term approach to drainage. This could help to resolve existing problems, but could also create possibility of significant, irreversible environmental harms and cumulative impacts.</p> <p>Bank assigned the NDP as “Category B” under OD 4.01, but acknowledged that “Category A” would have been more appropriate. Panel notes this acknowledgment, finds that decision of the Bank to categorize the Project as “Category B,” rather than “Category A,” did not comply with OD 4.01.</p>
<p>Analysis of Alternatives</p>	<p>As called for in the NDP SAR, a pre-feasibility study of an NSDS was carried out from January 2001 to November 2002.</p> <p>The Bank fielded an independent PoE to review the Report and advise the Government. The PoE recommended that the proposed NSDS be deferred and that it be considered only if alternative</p>	<p>Panel commends efforts and analysis that went into elements of 1993 DSEA. Panel finds, however, that certain problems arise in relying on its analysis of alternatives, which rapidly became out of touch with situation on ground. Analysis underestimated potential negative environmental effects in southern Sindh of relying upon and expanding LBOD. It did not provide an adequate basis to inform decision-</p>

	<p>approaches and measures—such as institutional and policy reforms, more efficient irrigation management, local stakeholder participation and management, and local drainage effluent disposal solutions—were not found adequate by themselves. The PoE, in its Draft Final Report of April 2003 also advised that further studies be carried out and their results incorporated in a proposed DMP for Pakistan.</p>	<p>making for NDP Project on core question of available alternatives, as required under OD 4.01.</p>
<p>Analysis of Potential Impacts</p>	<p>The 1989 EIA evaluated ecological impacts on the tidal creek, the coastal zone and the dhands. Exposing the dhands to the tidal fluctuations in the Tidal Link canal could have caused potentially serious ecological impacts. Therefore, the northern side of the Tidal Link canal was raised along the Pateji and Cholri Dhands and an overflow concrete-crested weir (Cholri Weir), 1,800 feet long, was constructed to protect the aquatic and marine ecology of the adjoining areas and to evacuate saline drainage water of the LBOD to the sea.</p> <p>All works under LBOD Stage I were completed except certain contracts pertaining to the remodeling of the Nara Canal, commissioning of the Jamrao Canal and some electrification works, which were carried over to the IDA-financed portion of the NDP project.</p>	<p>Project documents noted issue of potential impacts upon wetlands in southern Sindh, but did not assess how Project might affect wetlands or identify required mitigation measures at critical stage of Project design, as called for under OD 4.01.</p>
<p>Environmental Management Plan, Mitigation and Compensation</p>	<p>No report has yet been prepared on ex-post sampling, as required in the April 2000 MTR, to ensure compliance with the EA policy or the covenants concerning screening in the Project Agreement. Implementation of an Environmental Management Plan (EMP), required by the Project Agreement to cover the cumulative basin-wide environmental aspects and implications of the project as a whole, has not yet been achieved. Consultations on the DSEA appear to have been few, particularly with affected groups.</p>	<p>DSEA and other Project documents discuss or note important actions to be further developed and implemented. There has been, however, failure to adequately develop and, in particular, implement an EMP for Project. This does not comply with OD 4.01. EMP and its implementation are crucial to an Environmental Assessment.</p> <p>Failure to fully develop and implement an EMP, in line with OD 4.01, is a major obstacle to ability of Bank to respond to concerns of Requesters in this Project.</p> <p>The Panel notes Management's</p>

		<p>suggestion in June 2004 to make NDP funds available to mitigate flood damages to people. As Panel was finalizing Report, Management informed Panel that Government had provided funds to some individuals and families affected by the floods, including “<i>death compensation</i>” (318 people; 125 in Badin and Thatta) and compensation for houses fully damaged (tens of thousands) and partially damaged. Management did not provide further information on what had been considered and done with respect to compensation in relation to Project, including whether these payments referred to compensation for losses and/or income restoration. The Panel notes that significant Project funds seem to have been available, and were re-allocated under the Project to address other needs, including more than US\$135 million for drought relief actions not related to Project.</p> <p>Panel notes Management action to carry out socioeconomic study of livelihood of people living in the affected area, and related planning actions. Panel observes that this could yield new action in line with Bank policy.</p> <p>Several recommendations of IPoE, established after Request to review performance of LBOD, are designed to respond to the many problems facing the local communities living near the Tidal Link and dhands, including problems of sea water intrusion, flood risk, damage to the dhands, and negative impacts on livelihoods.</p>
Monitoring Plan	<p>Apart from ongoing bathymetric and hydrographic surveys of the Tidal Link canal by the National Institute of Oceanography (NIO) and water table and salinity monitoring by WAPDA’s SCARP Monitoring Organization (SMO), no further studies have been carried out, and no ecological monitoring, analysis or management of the situation in the area is taking place.</p>	<p>Panel commends Management for supporting NIO monitoring program activities but notes that comprehensive analysis and interpretation of data still absent.</p>

	In March 2001, the Bank fielded a Tidal Link Fact-Finding Mission. The Bank Fact-Finding Mission placed particular emphasis on the critical need to strengthen and expand the monitoring and study of the ongoing physical and morphological changes in the Tidal Link canal and the dhands, and of the environmental and socio-economic conditions in the dhands and their surrounding areas.	
The Drainage Master Plan (DMP)	<p>A draft of the DMP was completed in August 2004. At the request of the GoP, the Bank convened a PoE in September 2004 to review the draft DMP. The DMP PoE confirmed the finding of the earlier PoE that had reviewed the NSDS and rejected the concept of extending the LBOD or constructing major transbasin drains.</p> <p>The DMP, while not specifically mentioned in the SAR, was seen as part of the NSDS study. Both the NSDS and DMP studies were initiated more than halfway through the project implementation period.</p>	<p>DMP is likely to have major environmental and social implications for a long time. Development of DMP merited a “Category A” designation under OD 4.01. Bank’s designation of it as Category B did not comply with Bank policy.</p> <p>Final DMP includes provisional Environmental Assessment and framework for environmental management, and there are plans for “<i>detailed environmental study</i>” on the DMP’s effects on minority groups or tribal minorities.</p> <p>Panel is concerned about process through which DMP was elaborated. Far-reaching impacts to be expected, Bank’s assignment of “Category A” for each basin, and large budget proposed for implementing DMP, should have triggered a “Category A” designation for DMP.</p>
Environmental Advisory Panels	Issue not raised.	Failure to put in place an EAP for NDP Project until 2004 is inconsistent with what was intended under OD 4.01.
The Chotiari Reservoir	Issue not raised.	Reservoir inundation area covers and inundates large area of rare, unique and important habitat and wildlife. Appropriate EA for NDP Project would have properly assessed impacts before appraisal, when critical decisions regarding Project were being made. Assessment could have built upon previous analysis to extent available.
Natural Habitats OP 4.04		
The Dhands	According to the PSR, OP 4.04 (Natural Habitats) was not applicable. Natural habitats issues were to have been taken into account	Project focused on ensuring evacuation of LBOD effluents, and paid little attention to impacts on, or means to rehabilitate, dhands as a habitat and

	<p>in Initial Environment Scoping (IES) for investment subprojects as appropriate.</p> <p>The 1989 EIA evaluated ecological impacts on the tidal creek, the coastal zone and the dhands. Exposing the dhands to the tidal fluctuations in the Tidal Link canal could have caused potentially serious ecological impacts.</p> <p>Since the collapse of the weir and the cyclone breaches in the embankment, the water and salinity balance of the Tidal Link and the dhands have changed. The Tidal Link flow is no longer confined; instead, it is now intermingled with the flow to and from the dhands and the Rann of Kutch at every tide cycle.</p>	<p>ecosystem. This was not consistent with OP 4.04.</p>
<p>The Ramsar Convention and Ramsar Sites</p>	<p>The NDP project has not supported investments that directly affected the two dhands designated as Ramsar sites or any other sensitive wetland areas. Nurri (2,540 ha) and Jubho (700 ha) Lagoons were designated as Ramsar sites in October 2001, about four years after the NDP project was approved. The Rann of Kutch was also designated as a Ramsar site in November 2002. Long before these sites were given Ramsar status, and before the NDP project was initiated, the environmental importance of these sites was recognized, and the design chosen for the Tidal Link connecting KPOD to the sea incorporated measures for their protection and conservation. In addition, the LBOD EMMP proposed that extensive studies and monitoring be carried out to ensure their sustainable management.</p>	<p>Negative effects on dhands amount to a “<i>significant conversion or degradation</i>” within meaning of OP 4.04.</p> <p>Although difficult to separate impacts of LBOD system from NDP Project, evidence indicates the two, in combination, have contributed to significant adverse impacts on internationally recognized sites.</p> <p>Project did not adequately consider risks of further degradation of critical natural habitat Jubho Lagoon. This is not consistent with OP 4.04. In light of further work on the LBOD system, and in planning for implementation of DMP, it will be crucial for Management to be aware other critical natural habitats in region are under a similar threat, including Rann of Kutch and Nurri Lagoon.</p>
<p>Chotiari Reservoir</p>	<p>Issue not raised.</p>	<p>Bank withdrew from funding the Chotiari Reservoir following the Borrower’s rejection of FLAR. Bank retained supervisory responsibility in relation to project. Taking into account Management’s changing role, and potentially profound impacts on important and even possibly critical natural habitat in area affected by</p>

		reservoir, Management continues responsibility to monitor activity and its effects on sensitive areas of natural habitat.
Rehabilitation of Degraded Natural Habitat	<p>Based on the findings and recommendations of the Diagnostic Study, the formulation of a livelihood program will take cognizance of other ongoing and proposed Bank assisted activities, which also provide opportunities to address the three inter-linked concerns of poverty, environmental degradation and security from natural disasters.</p> <p>Management believes that the NDP project is being implemented in a manner that does not add to or exacerbate the environmental problems of the already degraded Indus River Delta or the coastal zone.</p>	Project in combination with inter-related LBOD system have produced significant negative effects on natural habitats, including dhands. Bank did not meet provisions of OP 4.04 to take action not only to conserve, but also to rehabilitate, these habitats.
Social Compliance		
Tribal People in Bank-Financed Projects (OMS 2.34) and the LBOD Project	Issue not raised.	Mallah in Badin are not so distinct or separate – whether culturally, socially, or economically – to be considered tribal group under provisions of OMS 2.34 during preparation of LBOD project.
Indigenous Peoples Policy (OD 4.20) and the NDP Project	<p>According to the PSR OD 4.20 (Indigenous Peoples) was not applicable. OD 4.20 on Indigenous Peoples does not apply to the Mallah community.</p> <p>The Mallah in Sindh were originally involved with guiding people at sea; the word Mallah in Sindhi derives from this activity. They are longtime, Sindhi-speaking Muslim inhabitants of the Province. Their principal occupation is fishing although some have also moved into agriculture. The fishing community is considered to form part of the mainstream in Sindh by a majority of the Province's population. The GoP does not have a classification for Indigenous Peoples. The Mallah fishing community does not meet the criteria specified in the Bank's OD 4.20 for classification as Indigenous People because it: (a) does not have an indigenous language distinct from the</p>	<p>Mallah seem to fit more, but not all, of the criteria of OD 4.20.</p> <p><i>Mohana</i> of Manchhar Lake who have migrated to Badin and Thatta appear to fit criteria of OD 4.20 more. The 1993 DSEA also mentions certain nomadic groups, likely referring to the <i>Kuchi</i> or the <i>Cholistani</i> nomads.</p> <p>Management did not initiate a process to determine whether NDP Project would affect any group of people which would qualify as indigenous peoples under OD 4.20. Management needed to consult with local anthropological and/or sociological experts to determine whether or not any of ethnic groups living within or near Project area would qualify as indigenous peoples under OD 4.20. Failure to do so does not comply with OD 4.20. At least some of these groups may have required Indigenous Peoples Development Plan (IPDP) under OD</p>

	<p>mainstream language of the region; (b) lacks customary social and political institutions; and (c) is not identified by others as a distinct cultural group.</p>	<p>4.20 during Project preparation. Such document, or similar document, could have identified potential Project impacts on these people and set forth measures to mitigate risks and potential harm.</p>
Cultural Property	<p>According to the PSR OPN 11.03 (Cultural Property) was not applicable. Cultural property issues were to have been taken into account in Initial Environment Scoping (IES) for investment subprojects as appropriate.</p> <p>According to available information, the Archaeology Department has not classified these sites to date and no excavations have been undertaken at any of them.</p>	<p>The Panel was not able to substantiate claims of Requesters that Project has affected cultural property. However, Management should have consulted with local archeological and historical experts to determine whether or not any sites of national, regional or local cultural heritage might be adversely affected by project. Such an expert assessment could have helped determine if any potentially important sites were threatened by waterlogging and salinity and, conversely, if sites might benefit from effective drainage.</p> <p>By not undertaking even a brief reconnaissance survey of cultural heritage in areas potentially affected by Project, and by <u>assuming</u> no important cultural sites would be adversely affected by project, Management did not comply with requirements of policy on Management of Cultural Property in Bank-Financed Projects, OPN 11.03.</p>
Involuntary Resettlement	<p>With respect to OD 4.30 on Involuntary Resettlement, the FLAR was agreed to during negotiations but objections were subsequently raised by the GoP and agreement could not be reached. Therefore, no subprojects involving resettlement were financed by IDA.</p> <p>Safeguard policy compliance was first rated in December 1999. Compliance with both the EA and Involuntary Resettlement policies was rated satisfactory. The rating for Involuntary Resettlement changed to unsatisfactory in 2001 due to continued disagreement with the GoP over the FLAR.</p> <p>IDA funding has not supported any subprojects that require land acquisition or resettlement. Subprojects that would have needed</p>	<p>Project Induced Displacement Panel considered whether Bank should reasonably have anticipated that Project could lead to such displacement. OD 4.30 would be applicable if appropriate risk analysis under Project indicates a significant possibility that Project will cause or substantially contribute to involuntary relocation.</p> <p>Panel recognizes that the Tidal Link situation was in flux at appraisal, but signs of major risk were present. The Panel observes that the Bank, at appraisal, failed to identify emerging risks that LBOD/Tidal Link problems could lead to significant harms and even displacement of local people, even though the Project had plans to complete and expand LBOD.</p> <p>Just a few months after appraisal, in June 1998, a large section of the weir</p>

land acquisition were excluded because of lack of agreement on the FLAR and the implementing agency's capacity to apply it.

The FLAR that was agreed by IDA and the GoP laid out the legal, institutional and implementation framework to guide compensation for assets lost, resettlement and rehabilitation involving project affected persons (PAPs) adversely affected by any subprojects under NDP. The FLAR required detailed field investigations including census, inventory of affected assets and preparation of appropriate RAPs or mitigation plans for subprojects that require land acquisition. Details on PAPs and entitlements were not included in the FLAR because these were to be included in subproject RAPs.

The FLAR was originally prepared in January 1996 and after much discussion was officially approved by the GoP and agreed with IDA, as noted in the SAR. However, during the Project Launch Workshop, in January 1998, WAPDA project directors raised objections to a number of provisions of the framework. Following further discussions with project officials during the April 2001 MTR, revisions to the FLAR were proposed in May 2001. However, no agreement was reached; the position of the Provinces was that: "Law of the land is comprehensive and takes care of all the concerns involved in RAP/FLAR." In view of the decision to include only those subprojects that do not involve land acquisition and resettlement in the IDA financed investment component, further discussions with the GoP on the FLAR were not pursued.

TORs for engagement of RAP consultants and RAPs were not prepared because the subprojects did not involve land acquisition. With

collapsed. The situation worsened with the near total collapse of the weir in the cyclone of 1999. When 2001 Bank Fact-Finding Mission determined that repair of the weir and embankments was not feasible, Bank staff acknowledged '*major risk*' of loss of livelihood. Panel found no evidence, however, of planning for protective resettlement.

Great risks faced by the people came to pass with the floods of 2003, and are ongoing. Bank failed to take the necessary actions under OD 4.30 to identify and prepare for the possibility of such displacement, and to assess the extent to which it has occurred.

Given that NDP Project is closed, the Panel is concerned about what may be done to redress harms, protect against possible ongoing displacement and support livelihoods.

Emergency Recovery Assistance. While the GoP requested Bank assistance for emergency repairs to the LBOD system, the Panel did not find evidence that Project funds were used to redress damages to the affected people, although such financing would have been available under OP 8.50. This is in contrast with the more than US\$135 million transferred for relief from drought.

Dislocation due to Land Acquisition for Civil Works. Aside from the unresolved issues of Chotiari Reservoir (see below), the Panel found no evidence of dislocation of people due to civil works during the NDP Project. Assurances that the LBOD will not be extended are, however, met with skepticism.

Framework for Land Acquisition and Resettlement (FLAR). FLAR is an appropriate document which was consistent with the requirements of OD 4.30. The preparation of the FLAR, the initial agreement with the Borrower, and its acceptance as part of Project

	<p>regard to the Requesters’ specific concerns, there is no land acquisition involved in the repairs and rehabilitation of the KPOD.</p>	<p>appraisal, were consistent with Bank policy requirements. The Panel notes that following Borrower’s rejection of FLAR, Management decided to withdraw funding from those Project components which, in its view, required resettlement. This was also consistent with OD 4.30.</p>
<p>Consultation and Community Participation</p>	<p>Consultations on the DSEA appear to have been few, particularly with affected groups.</p> <p>The NDP project, which marked a new concept in project design, was deliberately “frontloaded” with an institutional and policy reform agenda and “backloaded” with an investment program. Management sought to focus the dialogue on strengthening governance and transparency in the management of irrigation and drainage affairs—increasing community participation, strengthening environmental planning and management and improving water use efficiency.</p> <p>Through the formation of FOs, the NDP project has provided opportunities to marginalized groups, such as sharecroppers and farmers at the tail end of the system, to participate in decision-making on water allocations among farmers. A review of several subproject feasibility reports indicates that stakeholder views were taken into account in subproject design.</p> <p>All on-farm investments (tertiary irrigation channel improvements and subprojects for improvement of distributary canals) were/are being implemented through farmer participation. Water distribution, particularly the rotation schedules during times of water shortage, is prepared in consultation with FO representatives. In Sindh, about 200 FOs have been established, of which about half have taken on legal responsibility for operation and management of the tertiary irrigation system and for collection of water</p>	<p>During NDP Project implementation, Management insisted that Borrower abide by condition that agreed-to institutional reforms first be implemented before physical works could be carried out. The Panel notes that Management made efforts during NDP Project preparation to try to consult with and solicit the participation of a wide range of stakeholders and beneficiaries involved in this complex project covering much of the country.</p> <p>Within the boundaries of the pilot projects and the areas covered by effective FOs and AWBs, the NDP project complied with Bank policies that require consultation and participation.</p> <p>The Panel identified, however, serious problems with consultation and participation for the people living downstream of LBOD, including those closest to the Tidal Link. Unfortunately, the people of southern Sindh, whose lives were already recognized as being affected by the Tidal Link, fell outside the field of vision of those who designed and appraised the project.</p> <p>The Panel finds that an even more important consequence of this failure to implement the EMMP was an apparent lack of attention to the impacts of the structural failure of the Tidal Link on the local people at the tail end of the LBOD and KPOD, until the floods, death, and devastation of 2003.</p> <p>While the Bank complied with policy provisions on consultation and participation, with regard to the direct irrigation beneficiaries under the NDP,</p>

	<p>charges. With the aim of participatory decision making, the Chairman of the AWB is elected by the members, who include small farmers and farmers from the tail end of the distributary canal. Furthermore, in Sindh, an apex body called the Farmers Organization Council was established in 2001, to represent FOs.</p>	<p>it did not comply with them with regard to those adversely affected by the drainage systems investments under the LBOD and the NDP.</p>
<p>Disclosure of Information</p>	<p>With respect to disclosure of the EA, the NDP project was not in compliance with BP 17.50, Disclosure of Operational Information, since the DSEA was not disclosed prior to appraisal at the Infoshop and no records of disclosure in country could be located.</p> <p>The status of disclosure on NDP project documents is as follows:</p> <p>(a) DSEA (June 1993) – was accepted by the Bank as the EIA for the NDP project in January 1996 and, according to the Infoshop (then Public Information Center or PIC) was submitted and disclosed in April 1996. This disclosure took place after the October 1995 appraisal and was not in accordance with BP 17.50, para 13 for Category B IDA projects with a separate EA. No information could be located about in country disclosure of the DSEA to affected stakeholders or about subproject EAs or Project Feasibility Studies.</p> <p>(b) FLAR (January 1996) – was disclosed in May 2001 at the Infoshop. There was no requirement for the resettlement document to be disclosed prior to appraisal under OD 4.30. No information on in-country disclosure to affected stakeholders could be located.</p> <p>(c) PID – was disclosed in October 1994 and subsequently updated. The January 1997 PID processed by the PIC in the week ending February 7, 1997, contained, as required, an annex describing the EA, in accordance with BP 17.50, as did an earlier PID disclosed in the Infoshop in October 1995, prior to appraisal.</p>	<p>Management has acknowledged that the NDP Project did not comply with BP 17.50 with respect to disclosure of the EA, since 1993 DSEA was not disclosed in-country to affected stakeholders. The Panel notes this acknowledgement.</p> <p>Panel also observes that Management actively ensured that Project information was provided to farmer beneficiaries, but did not apply same efforts for other affected people in southern Sindh. This is not consistent with objectives of applicable Bank Policy on Disclosure of Information</p> <p>Panel recognizes that information disclosure in region involves significant logistical difficulties. At same time, local people affected by Project face major obstacles in gaining access to Project-related information of vital significance to them.</p>

	<p>Prior to Board approval of the project, the only document located that was translated into local languages was a briefing document. From 2001, a periodic bulletin on the NDP project has been disseminated in Sindhi to farmers and other stakeholders.</p> <p>Consultations were carried out in meetings with local communities of the subproject areas during field visits for subproject preparation. The social and environmental screening reports were not disclosed. None of the subprojects warranted a full EIA; therefore disclosure was not undertaken.</p>	
Supervision		
<p>Problem Identification and Corrective Measures</p>	<p>Since it became effective in February 1998, the NDP project has been intensively supervised by a combination of headquarters and field staff and consultants. Task management was based in the field from January 2000 to August 2003; the co-task team leader has always been located in Islamabad. In addition to regular interactions with the Borrower and implementing agencies, there have been ten full supervision missions. Supervision required above average costs because of the range of expertise required and the intensity of the effort, given the complexity of the project. Except for FY02, NDP project supervision costs were a factor of 2-3 times the norm in the South Asia region.</p>	<p>The Panel recognizes complexities of supervision and follow-up in a large-scale multi-donor effort such as LBOD. The Panel finds, nevertheless, that record of supervision indicates that one source of problems with Tidal Link was failure to give sufficient attention to technical problems that arose during its construction.</p> <p>The Panel finds that from late 1998 until the time that the Panel received the Request in September 2004, Management's supervision reports demonstrate sporadic concern for physical damage to the Tidal Link. The Panel finds that lack of response to the failure of the Tidal Link does not comply with OD 13.05.</p> <p>Management was slow to visit site of the Tidal Link failure, and did not have a consistent approach to interacting with local population to understand and address social and environmental implications of this failure. Management's failure to consult with downstream affected people for over half a decade following breaches in Tidal Link is of great concern to Panel. This does not comply with OD 13.05.</p> <p>The Panel observes that Management</p>

		<p>failed to assign appropriate expertise for supervision of technical aspects of construction work. As a result, Management failed to identify serious flaws in design and implementation of Project, and to initiate corrective measures in a timely manner. This does not comply with OD 13.05.</p>
<p>Final Implementation Completion Report (ICR) Conveyed to the Board</p>	<p>Issue not raised.</p>	<p>Cholri Weir collapsed only one week after publication of the Implementation Completion Report (ICR) for LBOD. This started unraveling of drainage outfall system. Panel is concerned that the ICR that was circulated to the Board was insufficiently transparent on important shortcomings of the project. The Panel cannot explain why Management’s internal checks and balances did not detect the discrepancies between the final report and supervision reports, and why final ICR was not amended, once it was shown to have been misleading in its assessment of the Project’s outcomes.</p> <p>The Panel notes that once Request was submitted, Management devoted significant resources to identify problems better and to develop long-overdue responses to help the affected people.</p>
<p>Conclusions</p>		<p>Down-stream effects, including those on the local populations of southern Badin, did not feature in any significant way either in the design or supervision of the Project. To a very large degree, the damages suffered by people in the project-affected areas have not been redressed, and many of the same conditions that led to these harms are still in place.</p> <p>The Panel notes that Bank has recently become engaged in preparing a Sindh Coastal Areas Development Program. If carried out successfully, this has the potential to bring some form of support to the areas and people affected by the events described in this Report.</p> <p>Panel also appreciates recent initial actions by the Government to address the structural problems causing harms</p>

to the affected population. Panel notes importance of implementing effectively actions addressing needs of affected populations.

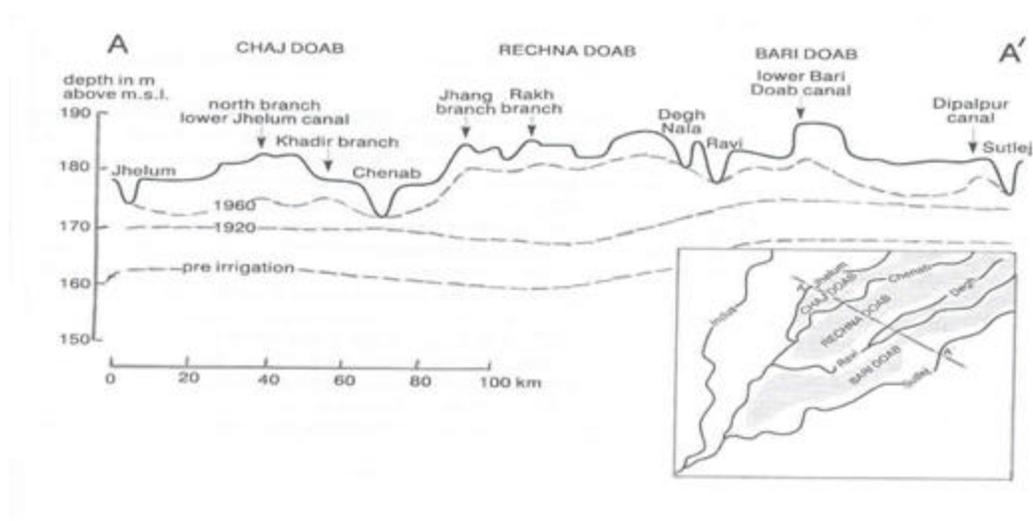
Annex B: Technical Descriptions relating to Indus River Basin - Irrigation and Drainage System

This Annex provides additional technical information relating to irrigation and drainage issues in the Indus River Basin. Section A provides technical information relating to the “*twin problems*” of waterlogging and salinity in the Indus River Basin. Section B identifies technical remediation measures that have been applied to address these “*twin problems*”. Section C reviews policy and institutional measures applied, at various times, to address the “*twin problems*”. Section D provides technical data relating to erosion and sediment problems linked to the collapse of the LBOD Tidal Link Cholri Weir.

A. The Twin Problems of Waterlogging and Salinity in the Basin

As described in the Report, the irrigation structures in the Basin led to what are referred to as the “*twin problems*” of waterlogging and salinity. To monitor the rising groundwater tables, observation lines of open water table observation wells were installed across the Punjab (Figure 3). The Punjab lines have registered one of history’s largest human-induced hydrological regime changes.

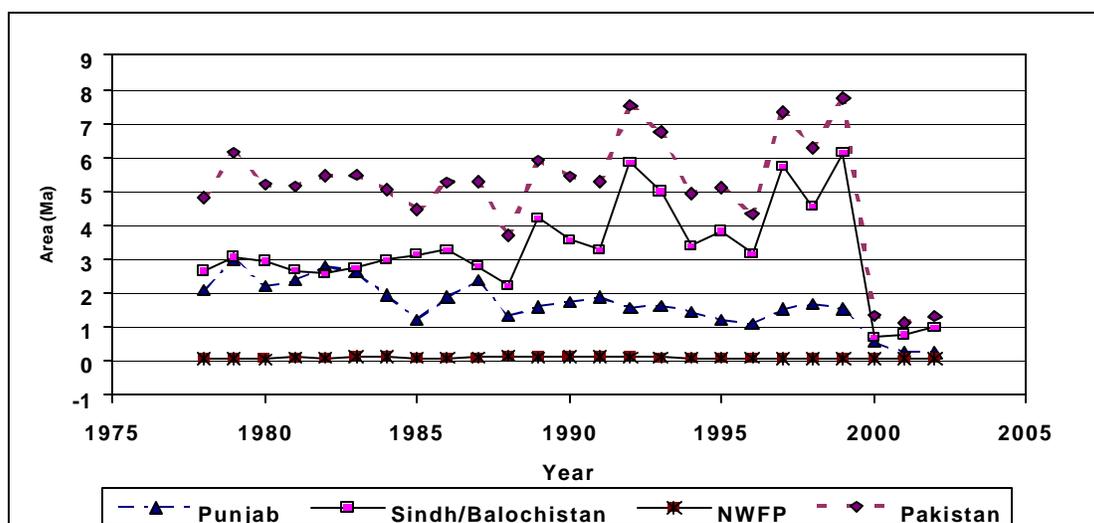
Figure 3: Irrigation Induced Rises of the Water tables in a Cross-section (observation line) over the Irrigated Land of Northern Punjab, 1860-1950.



Source: M. N. Bhutta and L.K. Smedema, Pakistan World Bank Country Water Resources Assistance Strategy, Paper # 11, Drainage and Salinity Management.

The waterlogged area reached its maximum extent in the 1970-80’s when up to 20-30% of the irrigated lands in the Indus Basin were reportedly under serious threat. Recent waterlogging and salinity statistics, however, indicate that the past trend of annually increasing areas has come to a halt and in large parts of the basin has even reversed (Figure 4). While most of this reversal may be attributed to the various preventive and remedial measures undertaken in the past, the reversal is also partly due to the prevailing drought conditions of the last 4-5 years.

Figure 4: Long-term trends in extent of severely waterlogged area (pre-monsoon watertable at depth of < 150 cm)



Source: M. N. Bhutta and L.K. Smedema, Pakistan World Bank Country Water Resources Assistance Strategy, Paper # 11, Drainage and Salinity Management

Especially the extent of the waterlogged area has decreased, with currently only some 10% the land being classified in the seriously affected category (pre-monsoon groundwater table depth of < 150 cm). The impact of the remedial measures and drought conditions has been less apparent in the salinity statistics. Most of the waterlogged and salinity affected area is located in Sindh province.

The salts occurring in the Indus Basin are of various origins. First, fossil salts deposited during the drier period in the geological formation of the Indus plains occur at various locations and depths in the substrata and in the groundwater. Some of this salt is mobilized by the ongoing tubewell pumping and by the deeper groundwater flows. These mobilized salts then become part of the salt dynamics of the root zone.

Second, marine salts originating from the geologically more recent rising of much of the Lower Basin contribute. Unlike the upper soil and groundwater layers in the oldest deposits farther inland, which may have become partly desalinized over time, the marine salts are still present at shallow depths in the younger lands of lower Sindh.

Finally, Indus irrigation water imports salts. Although this water is mostly of low salinity (only some 200-300ppm at Tarbela and other rim stations, as compared to 33000-37000ppm for seawater⁴⁹⁶), it nevertheless adds some 1.5-2.5 tons of salt per hectare per year to the irrigated land due to the lack of drainage.

Levels of salinity vary substantially both between and within regions. Most of the groundwater in the higher rainfall and naturally better drained lands of the upper basin is fresh groundwater. Pockets of saline groundwater occur but these are mostly confined to the central parts of the doabs (ridges between rivers), to areas near saline rocks and to the desert fringes. The occurrence of saline groundwater becomes more prevalent towards the middle and lower parts of the basin where almost all groundwater in the deltaic zones near the sea is highly saline (with the

⁴⁹⁶ Encyclopaedia Britannica, "Ocean," accessed on-line March 1, 2006.

exception of small fringes along the rivers and canals). In some parts of the saline groundwater zones with good drainage and heavy fresh water recharge, thin fresh water lenses may be found on top of the deeper saline groundwater. With careful pumping regimes these lenses may be used for irrigation and/or drinking water supply.

B. Technical Remediation Measures Applied to Address Waterlogging and Salinity

The following are measures that have been applied in the Basin to address, from a technical perspective, the “*twin problems*” of waterlogging and salinity.

Reducing canal seepage losses. The applied measures range from: lowering of the water level in canals, canal closure during low demand periods, installation of interceptor drains/tubewells, tree planting (bio-drainage) and canal lining. These measures were applied first by the Punjab Irrigation Department (PID) and mostly a small pilot scale. Interest faded when evaluation showed that most of these measures were either impractical (lowering water level and canal closure) or had a high cost (lining). Interest faded further when, following the spread of tubewells, fresh groundwater was recognized as a valuable resource.

Reducing on-farm deep percolation losses through water course lining, land leveling and improved on-farm irrigation. Especially the first two measures have been widely implemented. Farmers appreciated the measures more for the water saving than for the impact on waterlogging and salinization of the lands. Little is known on the present state of the implemented measures and their lasting recharge reduction impact.

Improved surface drainage. These measures were conceived to provide better crop drainage (less ponding/inundation) and also to reduce the groundwater recharge and thus help to keep water table down (water tables are known to rise pronouncedly during the rainy season). As such improved surface drainage was incorporated as a standard component in many SCARPs (Salinity Control and Reclamation Projects).

Groundwater drainage by tubewell pumping. Although most of the tubewells were actually installed for irrigation purposes, this measure by far has been the most effective intervention which has lowered water tables to safe depth in almost all fresh groundwater zones in the Punjab and also in most other provinces. Where the originally installed public tubewells became non-operational, their function in most fresh groundwater zone had been taken over by the private tubewells.

Groundwater drainage by pipe drainage. In the SCARPs, this measure was identified as the technology of choice for saline groundwater zones in which substrata conditions were unsuitable for tubewell drainage. These projects suffered from inexperience and technology challenges but these were largely overcome in the more recent projects. Further application of this technique will, however, be quite selective.

C. Policy and Institutional Measures

As noted in the Report, several types of policy and institutional measures have been applied or considered over the years to help address the “*twin problems*” of waterlogging and salinity in the Basin. These include the following:

Irrigation management: Major policy and institutional reform measures were initiated under the National Drainage Program (1995-2004). While most of these measures were not specifically designed to combat waterlogging and salinity, they were expected to contribute to the control of these problems. The Provincial Irrigation Departments (PIDs) are being transformed into PIDAs (Provincial Irrigation and Drainage Authorities) while the O&M tasks of the various canal systems were entrusted to self-accountable Areas Water Board (AWB), which in turn would delegate O&M of the distributaries and minor canals to Farmers Organizations (FOs). These reforms are at different stages of implementation in different provinces.

Pricing and subsidies: Water pricing has been advocated by various groups as an instrument to combat over-use of irrigation water but is not yet applied as such in Pakistan. Present water charges are based to some extent on the different water requirements of different crops but the prices are too low to have any impact on the overall water use by farmers.

Tubewell pumping is heavily subsidized. Installation and energy costs of all tubewells in saline groundwater areas are paid by public funds. This constituted a major burden on the treasury. The policy is now that all public tubewells will be phased out. Privately installed tubewells are also subsidized, mostly by the provision of low costs electricity connections and favorable electricity and fuel rates. The proponents of these subsidies contended that they lower the input costs of farming and, as a related benefit, control the water table and salinity.

Subsidies are also widely used to encourage the adoption of certain land and water management practices (land leveling, water course lining, on-farm surface drainage, use of gypsum and other on-farm water management improvements). Reclamation of salinized land and adoption of bio-saline agriculture are also encouraged by providing low cost loans, low cost renting of equipment and free technical assistance.

Annex C: Remote Sensing Analysis - Rainfall - Risk Assessment

Report by Dr. Peter Droogers, Panel Expert

1. Introduction

Agriculture in Pakistan depends heavily on irrigation and drainage as natural conditions are inadequate to sustain reliable crop production. Since 1960 investments have been substantially to improve water management for agriculture resulting in impressive increased agricultural production. Since the 1980's it became clear that investments in adequate drainage was essential to drain salt surpluses to keep agriculture sustainable. Millions of tons of salt enter the country through the Indus and since crops transpire only water, salt accumulation in soils is a common threat.

The World Bank has been actively involved in the development of drainage systems in Pakistan. It was in this context that the Left Bank Outfall Drain (LBOD) project and the following-up National Drainage Program (NDP), were undertaken with the overall objective to improve the drainage situation in the Left Bank areas in Sindh.

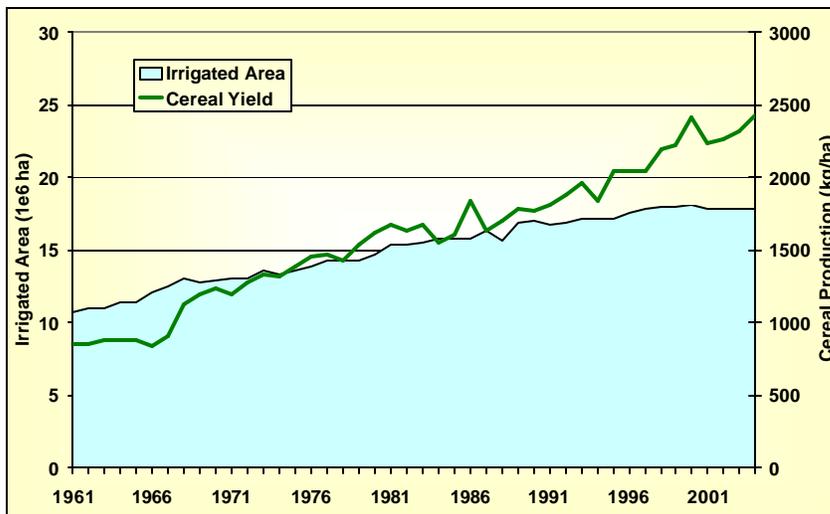


Figure 1: Agricultural production in Pakistan over the last 45 years

2. Rainfall, Risk and Design Criteria

2.1. Overview

Precipitation is the main driving force in hydrology, including associated engineering as irrigation, drainage and agro-hydrology. Unfortunately, limited data were available from the LBOD area and analysis has therefore been focused on global available datasets and some fragmented datasets.

One dataset used here originates from the CRU TS 2.0 dataset and comprises 1200 monthly grids of observed climate, for the period 1901-2000, and covering the global land surface at

0.5° × 0.5° resolution (Mitchell et al., 2003). There are five climatic variables available: cloud cover, DTR, precipitation, temperature, vapor pressure. For this analysis only the rainfall data were used. The original data are publicly available from the Climatic Research Unit at the University of East Anglia, along with guidance for their use and other documentation (Internet 1).

It should be emphasized that the CRU dataset is based on raw station data. Since data can be scarce in some regions or periods, a method called 'relaxation to the climatology' was used to create continuous grids. This implies that, for some areas or regions, data are less accurate. However, it is widely accepted that the dataset as it stands now is the best global source of meteorological data at a relatively high spatial and temporal resolution.

Figure 2 shows the annual rainfall over the last 100 years. Long-term mean rainfall is about 250 mm and substantial year-to-year variation can be observed. It is clear that for the LBOD area this variation is a key element in the design and operation of the system. From the same CRU dataset is also the maximum monthly precipitation plotted (Figure 3). Maximum monthly values can be as high as almost 300 mm and monthly values exceeding 200 mm occurred in 15 out of 100 years.

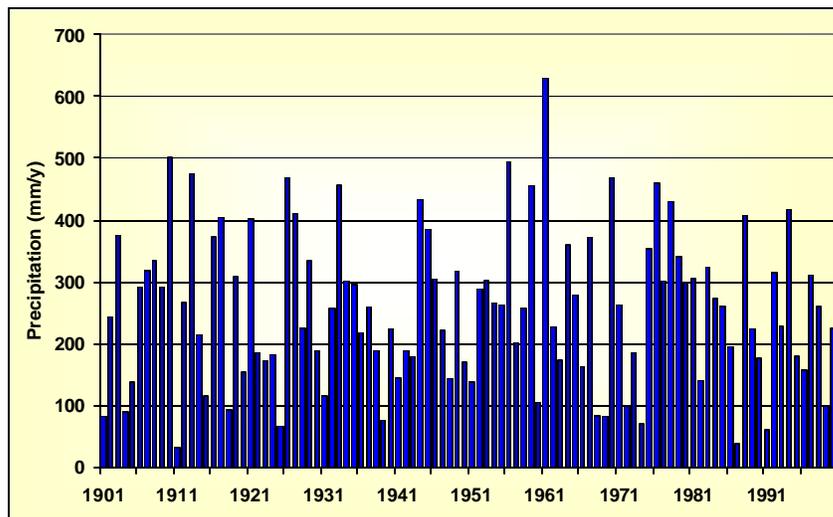


Figure 2: Annual rainfall of the LBOD area as derived from the CRU TS 2.0 data set

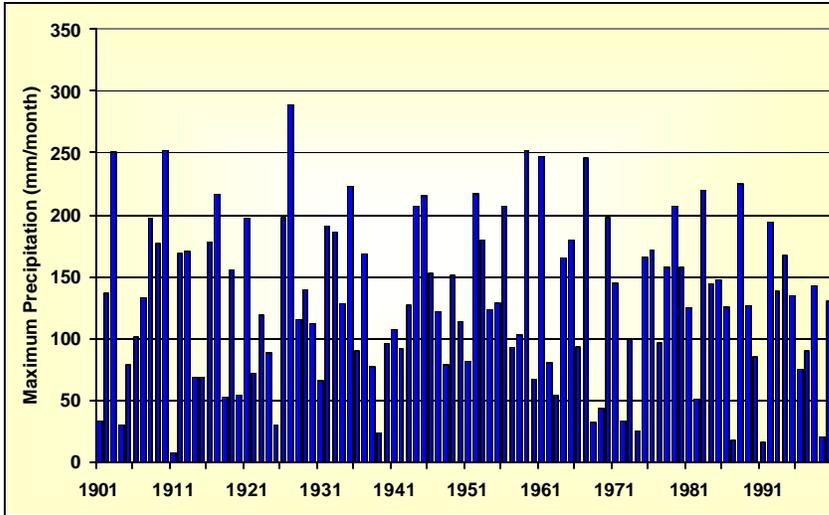


Figure 3: Maximum monthly precipitation of the LBOD area as derived from the CRU TS 2.0 data set

2.2. Probability Analysis

Probability analysis is key to appropriate project design. For the LBOD proper planning in terms of risk, exceeding of certain threshold values, is essential. For most of the analysis the Weibull distribution is used as it is one of the most widely used distributions in probability engineering. It is a versatile distribution that can take on the characteristics of other types of distributions, based on the value of the shape parameter.

Most probability analysis are based on plotting the highest m number ranked so that:

$$P(X \geq x_m) = \frac{m - b}{n + 1 - 2b}$$

where n is the number of years, m the rank, and b a shape factor. For the Weibull function b should be taken as 0 (Chow et al.,1988) where the equation yields:

$$P(X \geq x_m) = \frac{m}{n + 1}$$

Instead of plotting the Recurrence Interval (P) often the Exceedence Probability (T) is used, which is the inverse of the Recurrence Interval. This Exceedence Probability for Weibull is:

$$T = \frac{n + 1}{m}$$

For the 100 year of monthly rainfall records this Exceedence Probability is plot in Figure 4. The associated equation yields:

$$PCP = 105 + 47 \ln(T)$$

where PCP is monthly precipitation (mm) , and T is recurrence interval (years).

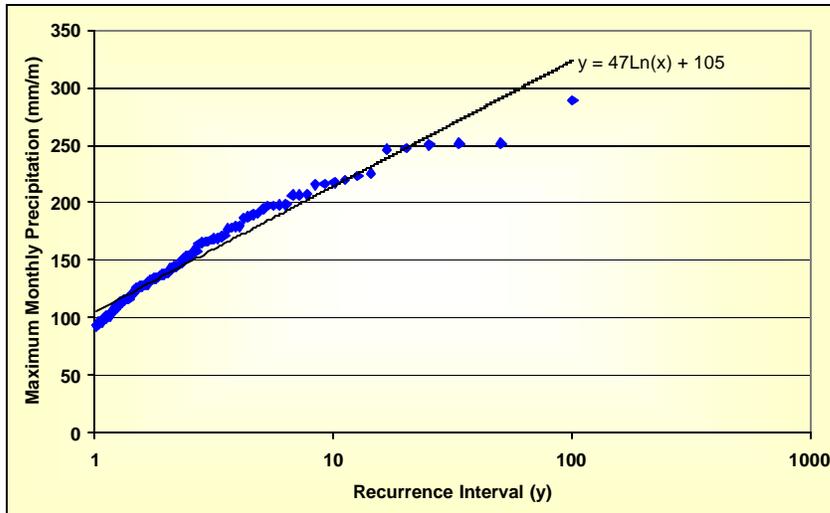


Figure 4: Recurrence Interval for the LBOD area as derived from the CRU TS 2.0 data set.

As indicated before, these analyses were performed using 100 years of data from a global gridded data source. Based on observed records of 51 years monthly values for Hyderabad (1950-2000) the derived probability was very close to the gridded one, proving the reliability of the gridded data set:

$$PCP = 104 + 60\ln(T)$$

Since Hyderabad was at some distance from the region of interest, it was decided to perform the analysis on the Badin gridded dataset.

Based on the equation for the Badin region the following Recurrence Intervals have been derived:

Recurrence Interval (Years)	Monthly Rainfall (mm)
10	214
25	258
50	290
100	323
500	399

The design criteria of LBOD's canals were based on the assumption that drainage sources would be cut off during heavy rainfall, so that canals would only be used to carry runoff from rainfall. The capacity of the canals was designed so that rainfall events of 125 mm in five days could be carried by the canals in five days (World Bank, 2005). Although the probability analysis of the rainfall in the previous section was based on monthly records, they still can be used for the risk assessment in these five days. Precipitation patterns in the region are very erratic and 125 mm in five days is often similar to 125 mm in one month. Considering this assumption we can derive from the probability analysis that the recurrence interval of this 125 mm is 1.5 year.

During the storm of July 2003 Badin received 218 mm of rainfall and the upper part of the LBOD region 191 mm (World Bank, 2005). Recurrence intervals of these rainfall events are 11 years (218 mm) and 6 years (191 mm). Note that these rainfall numbers as given are based

on the rainfall during the storm event of July 2003 and expanded several days, but not an entire month. As indicated earlier rainfall in the region is erratic and it is therefore assumed that these multi-days events can be indicative used for comparison to the monthly based probability analysis. In table form:

Station	Rainfall (mm)	Recurrence Interval (Years)
Badin	218	11
Upper Part	191	6

For the entire month July 2003 rainfall records were provided for three stations (WAPDA, 2003). Totals for this month and its recurrence interval are:

Station	Monthly Rainfall (mm)	Recurrence Interval (Years)
Badin	304	66
Nawabshah	292	52
Mirpurkhas	192	6

Table 1: Location of the meteorological stations (source: Internet 2)

Station	Lat	Long	Elevation
M.O. Badin	24.38'	68.54'	09 meter
PBO. Nawabshah	26.15'	68.22'	37 meter
Mirpurkhas			

Given the fact that the design criteria for drainage conditions is based on 1.5 cfs/miles² contribution of the drainage component is relatively small compared to rainfall events, although still about 3000 cfs or 83 m³/s. The design assumption that people in the region would not release water from inundated lands failed completely during the July 2003 rainfall (WAPDA, 2003). It is certainly questionable whether such a design assumption can be justified in terms of normal risk assessment. From a pure engineering approach this design criterion is valid, but it does not take account of the realities on the ground.

The Badin area had been affected badly from flooding due to heavy rainfall events before the implementation of the LBOD systems. Records indicate that heavy flooding occurred in 1959, 1961, 1962, 1964, 1967, 1970, 1973, 1976, and 1979 (WAPDA, 2003). Rainfall intensity during these events was between 203 mm and 609 mm. Given this high frequency of flooding and the heavy rainfall intensities it is somewhat questionable whether the design criteria of LBOD for storm flow events were appropriated from a risk management perspective.

2.3. Cyclones

An in-depth analysis of the occurrence of cyclones has not been performed, but some general statistics show that the occurrence of cyclones is not negligible and should have been taken into account during design. The data of the National Institute of Oceanography in Karachi indicate that over the last 100 years nine cyclones hit the area: a recurrence interval of about ten years.

The Pakistan Meteorological Department presented that a total of 49 cyclonic storms were formed in the Arabian Sea during the last hundred years (1891-2000). From these 49 storms

11 hit the Pakistani coast (five in Mekran and six in Sindh), so again a recurrence interval of about ten years.

These data show that the occurrence of cyclones is not negligible and should have been taken into account during design.

In summary the following conclusions can be drawn from probability analysis, and the July 2003 rains in particular, in relation to risk assessment:

The July 2003 rainfall events had a recurrence interval between six and 66 years, depending on the station analyzed and whether multi-day or monthly rainfall was considered. It can therefore be concluded that the rains in July 2003 were to a certain extent somewhat beyond normal risk assessments, but the rains could certainly not be classified as an unusual extreme event.

The design criteria of the LBOD system to carry rainfall runoff are based on a five-day event of 125 mm to be discharged in five days. Given the erratic nature of rainfall in the area, it can be assumed that 125 mm in five days can be translated to 125 - 200 mm per month. Using monthly probability analysis of rainfall in the area, a rainfall event of 125 mm per month has a recurrence interval of 1.5 years and an event of 200 mm a recurrence interval of 7.5 years.

The occurrence of cyclones is not negligible and should have been taken into account during design.

Frequently, the Badin area had been affected badly from flooding due to heavy rainfall events before the implementation of the LBOD systems. Given the high frequency of flooding and the heavy rainfall intensities associated to this, it is questionable whether the design criteria for storm flow events were appropriated from a risk management perspective.

The assumption made during the design phase of the project that no drainage from agricultural lands would take place during heavy rainfall is questionable. From a pure engineering approach such a design criterion is valid, but it does not take into account the realities on the ground.

Overall, it can be concluded that the design criteria of the LBOD to carry rainfall runoff is weak from a risk assessment point of view.

3. Remote Sensing Analysis

3.1. Introduction

The most critical part of the LBOD is the final reach where the drain falls out into the Arabian Sea. A tidal link was built connecting the end of the KPOD (Point Zero) with the Arabian Sea via the Shah Samando creek. The Tidal Link takes a southeastern direction from Point Zero and intersects an important wetland (dhand) area. The Tidal Link has a total length of around 45km and to the north of the Tidal Link the Memro (Mehro), Sanhro, Cholri and Pateji dhand's are situated, whilst to the south the Rann of Kutch is located, which is a shallow

pond surrounded by extensive mud plains. Figure 5 shows an overview of the Tidal Link and the surrounding areas.

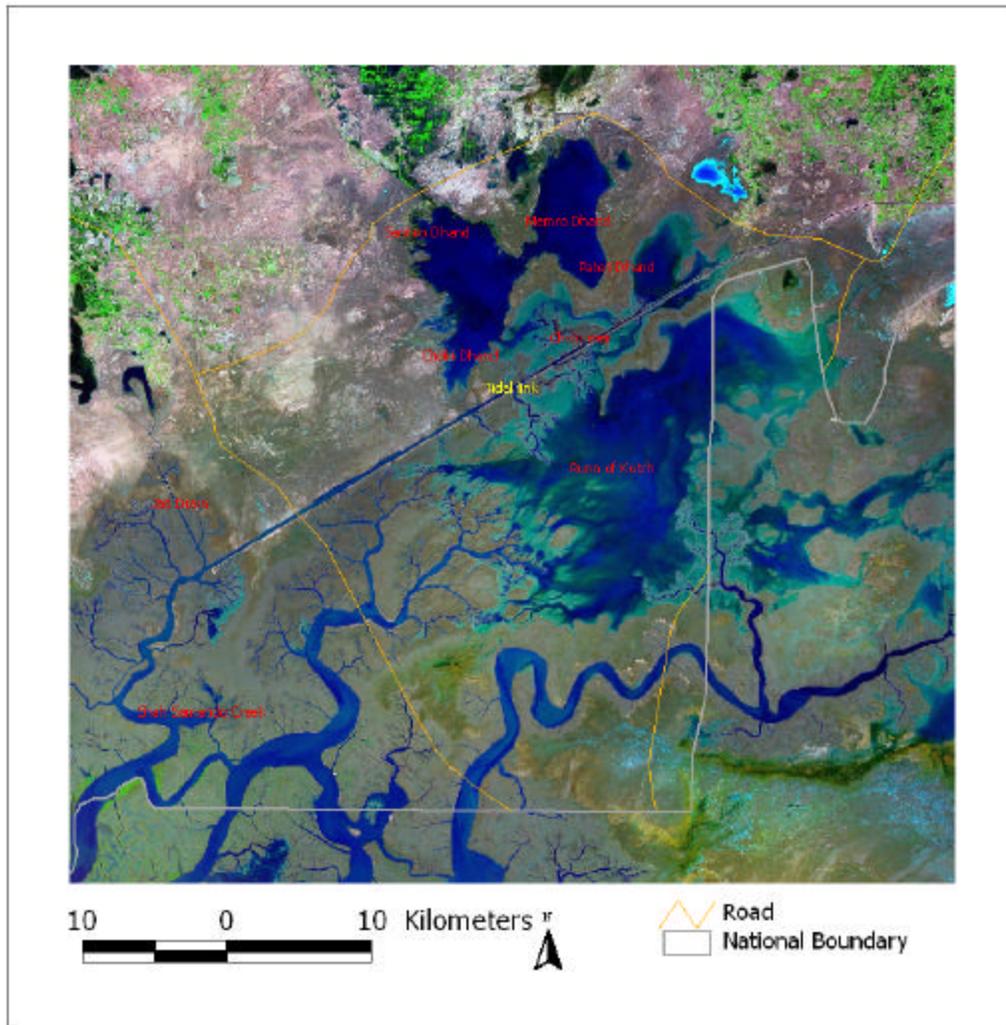


Figure 5: Location of the Tidal Link and the connecting creek and wetland systems

The Tidal Link and the surrounding areas have suffered from severe damage since it became operational in June 1995. Several key events can be identified:

- A weir was constructed near the Cholri Dhand with the objective to attenuate peak levels caused by high tides and to preserve the environments of the northern dhands. On June 24, 1998 a part of the weir collapsed and the Tidal Link had an open connection with the dhand system in the north ever since.
- On May 21, 1999 the tidal areas were hit by a tropical cyclone and the structure was flooded by seawater. Large parts of the embankments were destroyed and breaches occur along the entire Tidal Link.
- In 2003 the area suffered again from a cyclone and flooding and many people in the area associated the flooding with the failure of the outfall system.

These key events have led inevitably to a number of undesirable effects:

- Because of the many breaches in the structure a new river and creek system has developed and consequently changed the entire water and salt balance. The tidal influence has been extended even up to Point Zero, which results in high salinity levels of the dhands.
- Before the Cholri Weir collapsed and the embankments breached the water levels in the dhands were kept artificially at a constant level by the weir. Nowadays the water levels are under tidal influence. Agricultural lands are flooded periodically and salts remain on the surface.
- The destruction of the Tidal Link has led to an increased susceptibility of settlements around the dhands to flooding, inducing higher stress on the already vulnerable livelihoods.

There is a strong need to clarify and understand the system better. The area is very inaccessible and field visits are virtually impossible. Analysis of satellite imagery (Remote Sensing) offers the possibility to assess these effects visually in an integrated manner. Moreover, Remote Sensing has the advantage that information, prior to the construction of the LBOD, can be assessed as well.

In summary; the objectives of this analysis is to evaluate changes in the environment induced by the LBOD and its impact on people living in the area.

3.2. Background Remote Sensing

Remote sensing is a technique to observe the earth surface remote from that surface. The different sensors used today differ in the sense that they are able to measure the reflected radiation in specific parts of the electromagnetic spectrum. The radiation in the different parts of the spectrum is related to factors such as vegetation, moisture and others. The measured reflected radiation in a specific interval of the electromagnetic spectrum is stored as a single 'band' in a satellite image. Most sensors have several bands within the visible part of the electromagnetic spectrum.

Another distinct feature between the different sensors is the spatial detail they can observe. The smallest spatial detail that can be observed is called pixel. The spatial resolution (pixel size) varies from centimetres to kilometres and in general the revisit frequency of a certain satellite sensor decreases with an increased spatial resolution. The same is true for the image size. A sensor with a spatial resolution of 1 kilometre can capture a larger part of the earth in one pass than a sensor with a spatial resolution of 30 meters. In general sensors with a spatial resolution of 1 kilometer are better equipped for monitoring the behaviour of processes over time at the earth surface because they can observe the same spot on the earth every day. Sensors with a spatial resolution of 30 meters or less are better equipped for studies on local level because they observe the earth with higher detail. The disadvantage is that these images can be recorded only every two weeks or less.

It is clear that Remote Sensing has received a lot of attention over the last decades. The search term "Remote Sensing" provides over 1.5 million hits in Google and refining this by including the word "water" still provides over 0.5 million hits. The extended fleet of earth observation satellites has been expanding exponentially over the last 25 years (Figure 6) and scientific developments in terms of accuracy, resolution, and knowledge to convert signals to

physical realities are enormous. Obviously, the attractive colored images that can be produced made Remote Sensing popular and have definitely influenced policy makers.

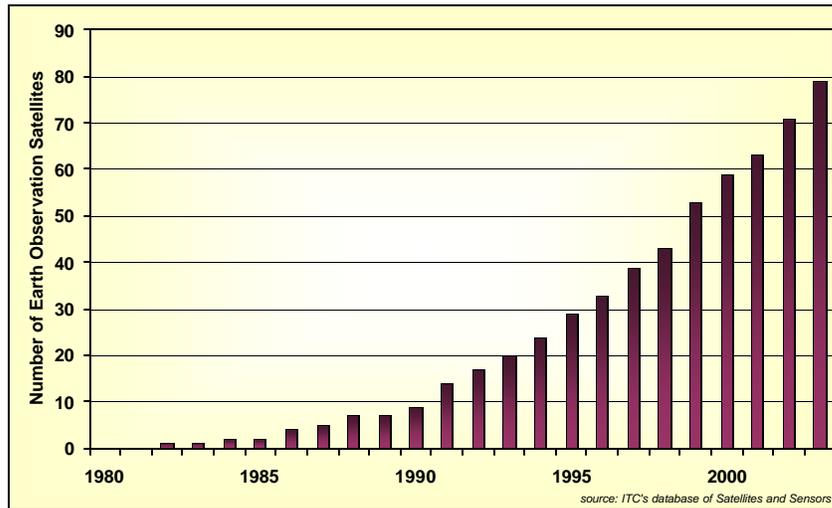


Figure 6: Development of the number of earth observation satellites able to detect water and land related processes.

The term Remote Sensing was originally used for air-borne as well as space-borne platforms, but nowadays Remote Sensing is becoming more and more focused towards detecting earth processes from space. The simple reason for this is that high resolution observations were originally only achievable by airplanes, but are nowadays available from space at the cost of only a small fraction of acquiring those images by plane. However, there is still a strong correlation between the frequency of overpass of the satellite and the resolution of the sensor: higher resolutions correspond with lower frequencies and vice versa (Figure 7).

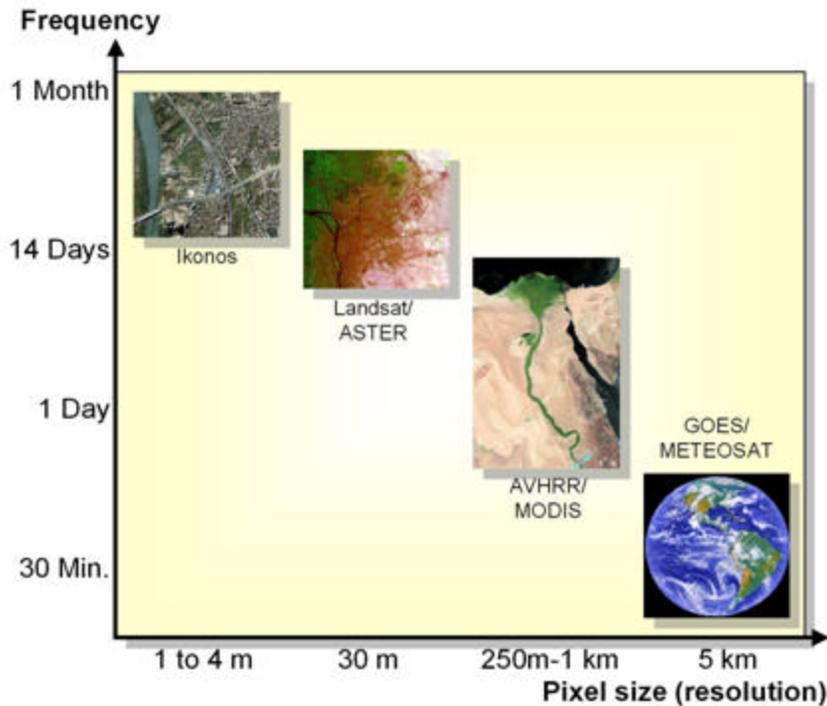


Figure 7: Relationship between frequency of overpass and level of detail.

What can be observed can be broadly categorized by looking at the two types of sensors: passive and active. A sensor can be described as a device that measures and records electromagnetic energy. Passive sensors depend on an external source of energy, usually the sun (although sometimes the earth itself). The group of passive sensors covers the electromagnetic spectrum in the range from less than 1 picometer (gamma rays) to over 1 meter (micro and radio waves). Active sensors have their own source of energy. Measurements by active sensors are more controlled because they do not depend upon the (varying) illumination conditions. Active sensors include laser altimeter (using infrared light) and radar.

The specific use of Remote Sensing in water resources studies is extensive and expands from water bodies itself to water-land processes. Some of the most important features are:

- Vegetation
- Biomass growth
- Evapotranspiration
- Lake levels
- Digital Elevation Models (DEM)
- Land cover and land use
- Soils
- Salinity
- Snow cover
- Precipitation
- Groundwater

The current knowledge and available techniques to derive these properties vary but a clear trend can be observed that more and more data will originate from Remote Sensing as shown in Figure 8 (Droogers and Kite, 2002).

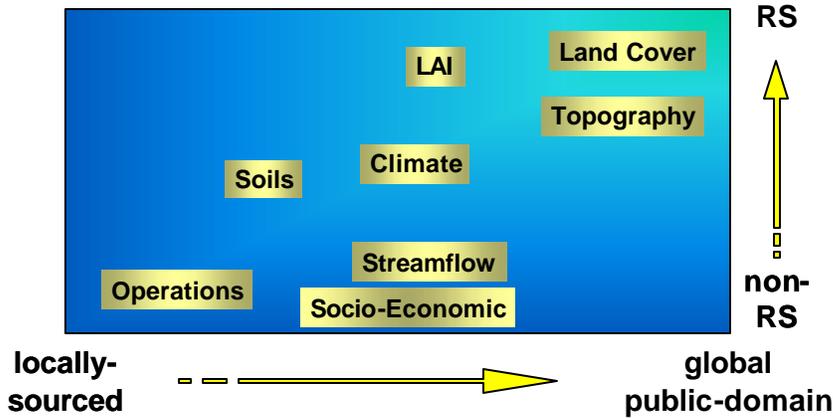


Figure 8: Data requirements in water resources studies and the shift from non-remote sensed data and locally sourced ones towards public domain and remotely sensed derived (Droogers and Kite, 2002).

3.3. Remote Sensing for the LBOD A rea

3.3.1. Landsat

For application for the LBOD the Landsat satellite has been selected. The Landsat satellite provides an appropriate mix between temporal, spectral and spatial resolution. The spectral bands of the Thematic Mapper (TM) sensor aboard the Landsat satellite have been plotted in Figure 9 together with representative spectra of vegetation, water and bare soil.

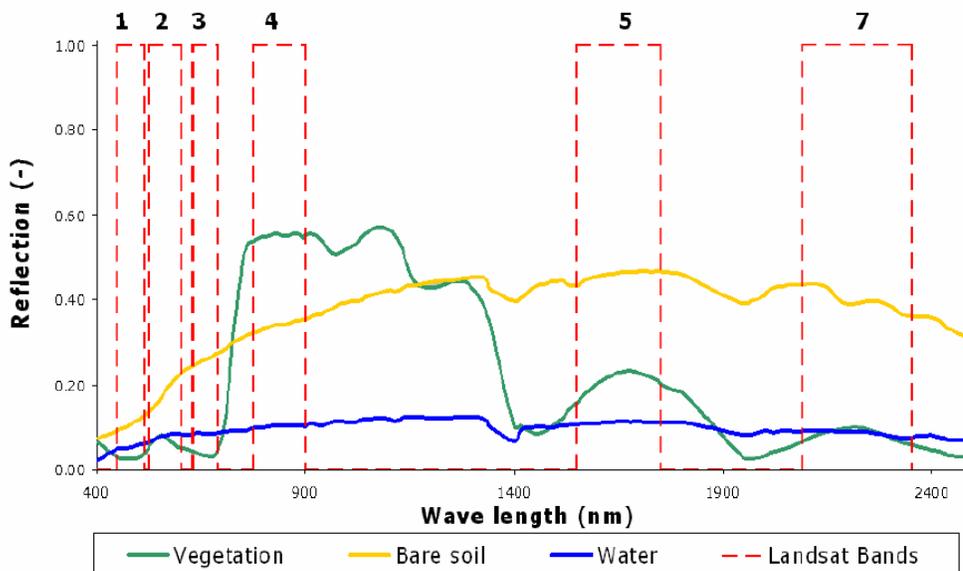


Figure 9: Spectral behavior of major land uses and the spectral bands of the Landsat satellite

A time series of Landsat images have been used in the analysis. Six raw images and two composite images (GeoCover dataset) were obtained. The GeoCover datasets have the advantage that they are completely corrected, ready to use and covering a larger area than standard images. On the other hand are they somewhat limited as the dates of acquiring is unknown and only three bands are delivered. The two GeoCover datasets are:

- Landsat 7, circa 2000, resolution 14.25 m
- Landsat 4/5, circa 1990, resolution 28.5 m

Other characteristics of the GeoCover images:

- Band 7 (mid-infrared light) is displayed as red
- Band 4 (near-infrared light) is displayed as green
- Band 2 (visible green light) is displayed as blue

Besides the GeoCover dataset two images were used which were acquired with the Thematic Mapper sensor aboard the Landsat 5 satellite, which is in orbit since 1984. Four images were used which were acquired with the Enhanced Thematic Mapper (ETM+) aboard the Landsat 7 satellite which is in orbit since 1999. The images acquired with the TM sensor have all seven bands and the ETM+ images have six bands since the thermal infrared channel is processed separately.

Table 2: Satellite imagery used

Satellite	Sensor	Path	Row	Acquiry date	Number of bands
Landsat	TM	151	44	21 October 1989	7
Landsat GeoCover	TM	N/A	N/A	around 1990	3
Landsat	TM	151	43	10-Oct-98	7
Landsat GeoCover	ETM+	N/A	N/A	around 2000	3
Landsat	ETM+	151	43	28-Sep-01	6
Landsat	ETM+	151	43	30-Oct-01	6
Landsat	ETM+	151	43	21-Nov-03	6
Landsat	ETM+	151	43	22-Oct-04	6

3.3.2. Visual Interpretation

The satellite images have been visually interpreted. Human perception of color comes from the relative amounts of red, green and blue light. All other colors are made of a mixture of these three colors. In most cases satellite images have more than three bands and since a computer screen can only display three colors, a selection of three bands has to be made before the image can be displayed. Commonly used band combinations for displaying Landsat images are (RGB - red/green/blue):

- 3,2,1 – natural colour (true colour)
- 7,5,3 – pseudo-natural colour image
- 4,3,2 – colour-infrared (the ‘traditional’ false colour)
- 4,5,3 – a combination that provides the best delineation between vegetation types
- 7,4,2 – provides the best distinction between rock types – geological applications

Figure 10 shows examples of the Tidal Link area with different commonly used band combinations.

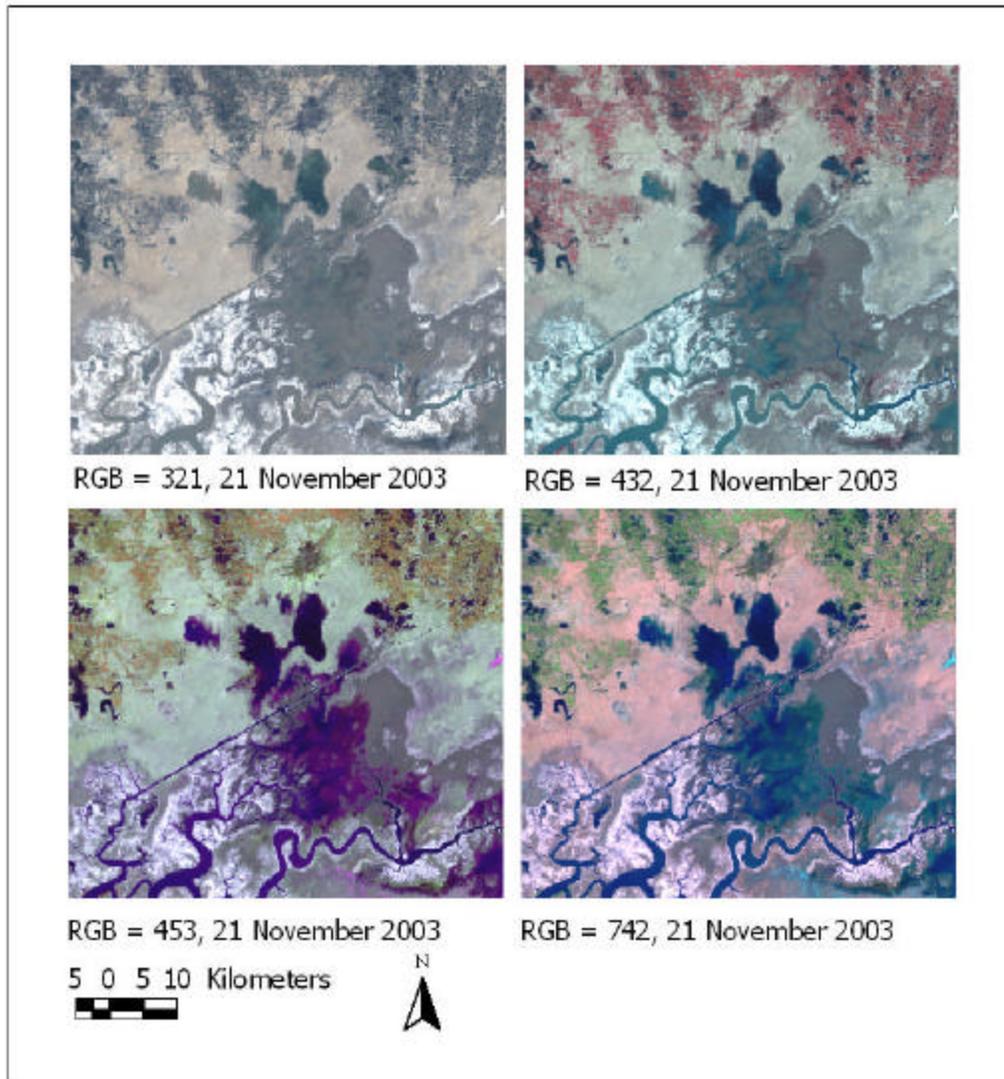


Figure 10: Different band combinations Landsat.

In this case the 7,4,2 combination was mainly used for the interpretation. The visual interpretation focused on five different topics in the area around the Tidal Link:

- General overview
- Changes in the Tidal Link and the embankments
- The extent of the dhands
- Agricultural effects
- Salinization

3.3.3. General Overview

Figure 11 shows an overview of the area in October 1989 prior to the construction of the Tidal Link. It does show that the entire dhand system as well as the Rann of Kutch are all

connected and form one large wetland/lake ecosystem. The depth of the water is, judging by the intensity of the blue color, not varying very much. In the North East corner the endpoint of the LBOD is visible. Besides a few small dried out lakes there is no evidence of salt crusts on the surface. The agricultural areas have extended right down to the Sanhro and Memro (Mehro) dhands.

Interesting is that the Shah Samando Creek is not linked to the dhands nor to the Rann of Kutch. Drainage from these wetlands took place via the two creeks located east of the Shah Samando and to the south. Despite this, the Shah Samando was selected to drain water from the LBOD through the Tidal Link. Although the connection to the other creeks is closer for some reason it was selected to opt for this less natural discharge routing.

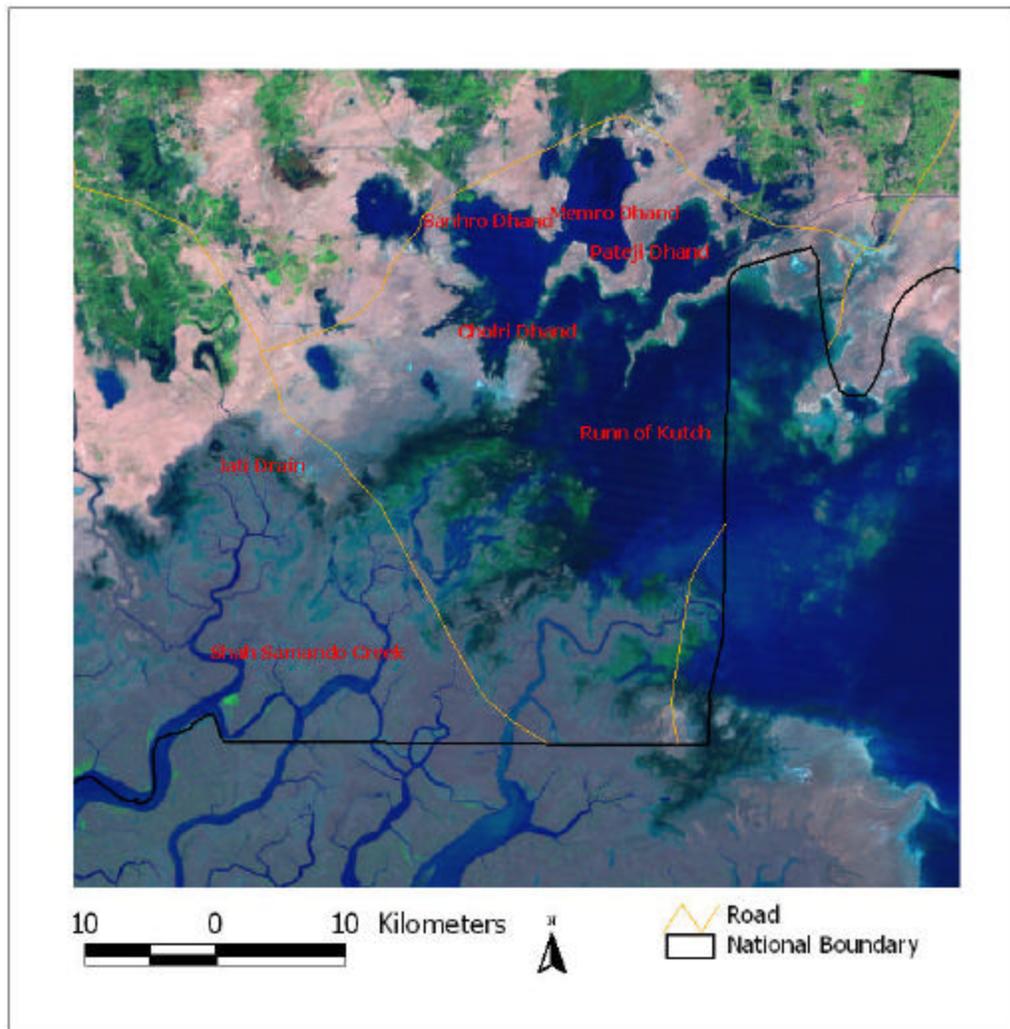


Figure 11: Overview before construction of the Tidal Link (21 October 1989).

Figure 12 shows the situation in October 1998 during low tide, where the white areas indicate mud planes. This is the moment just after the Cholri Weir has collapsed but before major damage was done to structure by the May 1999 cyclone. The figure shows that the dhand and the Rann of Kutch water systems are now separated by the embankments of the Tidal Link.

The depths of the dhands are varying more than before and along the shores of the Northern dhands vegetation is well developed.

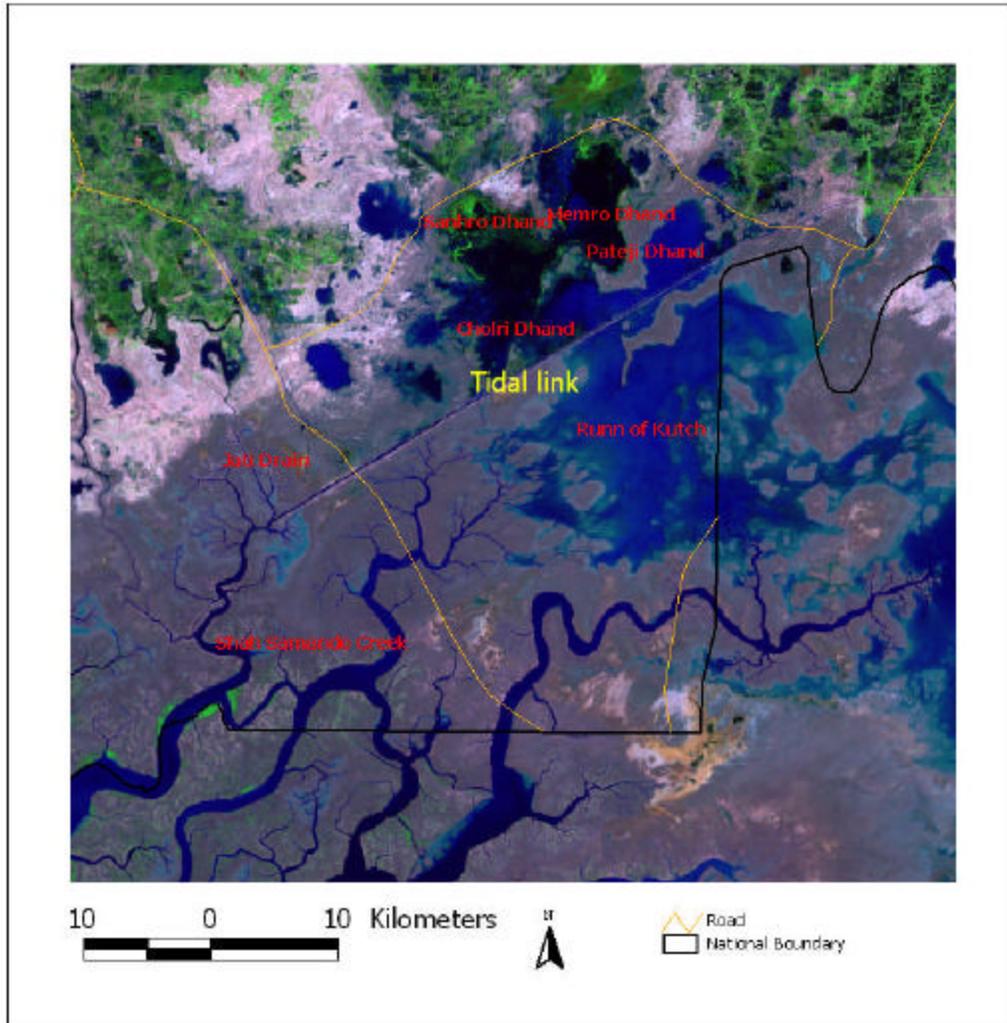


Figure 12: Overview after construction of the Tidal Link (30 October 1998)

Figure 13, below, gives an overview of the area in October 2003. The image provides the evidence of the enormous changes that have occurred in the system. The May 1999 cyclone as well as the flooding in 2003 has done severe damage and it is clearly visible the structure has been breached in many places. A whole new morphological system has developed of active tidal creeks and mud plains caused by sedimentation at the interface of salt and fresh water.

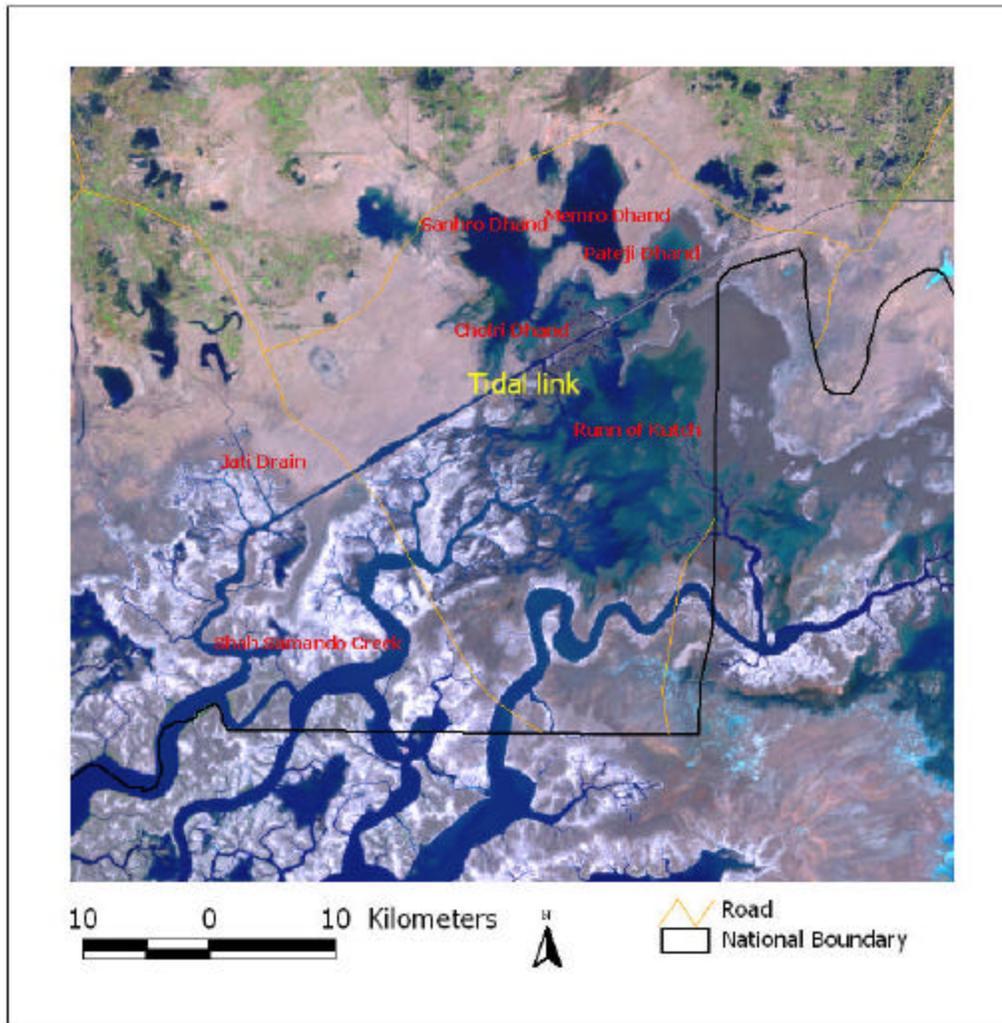


Figure 13: Overview after sever damage to the Tidal Link (11 November 2003).

3.3.4. Changes in the Tidal Link and the Embankments

Figure 14 shows a close-up of the area around the Cholri Weir in October in 1989, 1998, 2001 and 2003. The weir collapsed in June 1998 and the breach is clearly visible in the 1998 image. In October 1998 the structure has been breached along a length of 450 meter. Three years later, in 2001, a whole new creek / sedimentation system has developed to the North of the former weir. A very dynamic system has evolved with obvious tidal influences. In October 2003 the creek system is more or less similar as two years earlier. Apparently, a state of equilibrium has been established in these two years time in the development creeks and breaches in the Tidal Link. However this does not apply to the lower reach of the Tidal Link where important morphological changes continue.

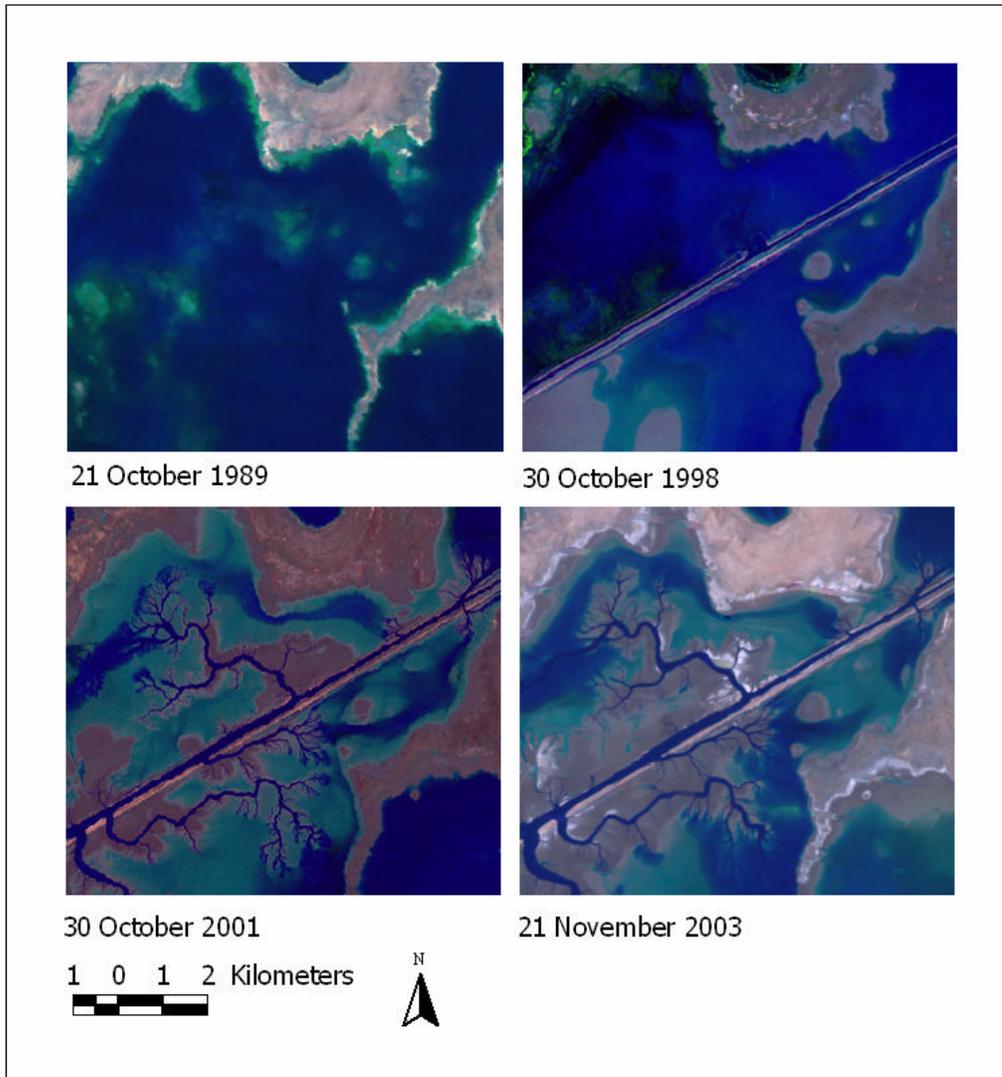


Figure 14: Changes at the location of the Cholri Weir

Figure 15 shows that these developments do not only occur at the Northern side of the structure. These images are a close-up of the area just South of Cholri Dhand, which is around 5km more toward the Arabic sea than the previous images. In October 1998 the structure is still largely intact. After the 1999 cyclone the structure breached at many places and by 2001 an active creek and sedimentation system has developed. Similar systems have developed along the full length of the structure and it is evident that these changes will have profound effects on livelihoods of the fishermen and other inhabitants of the area.

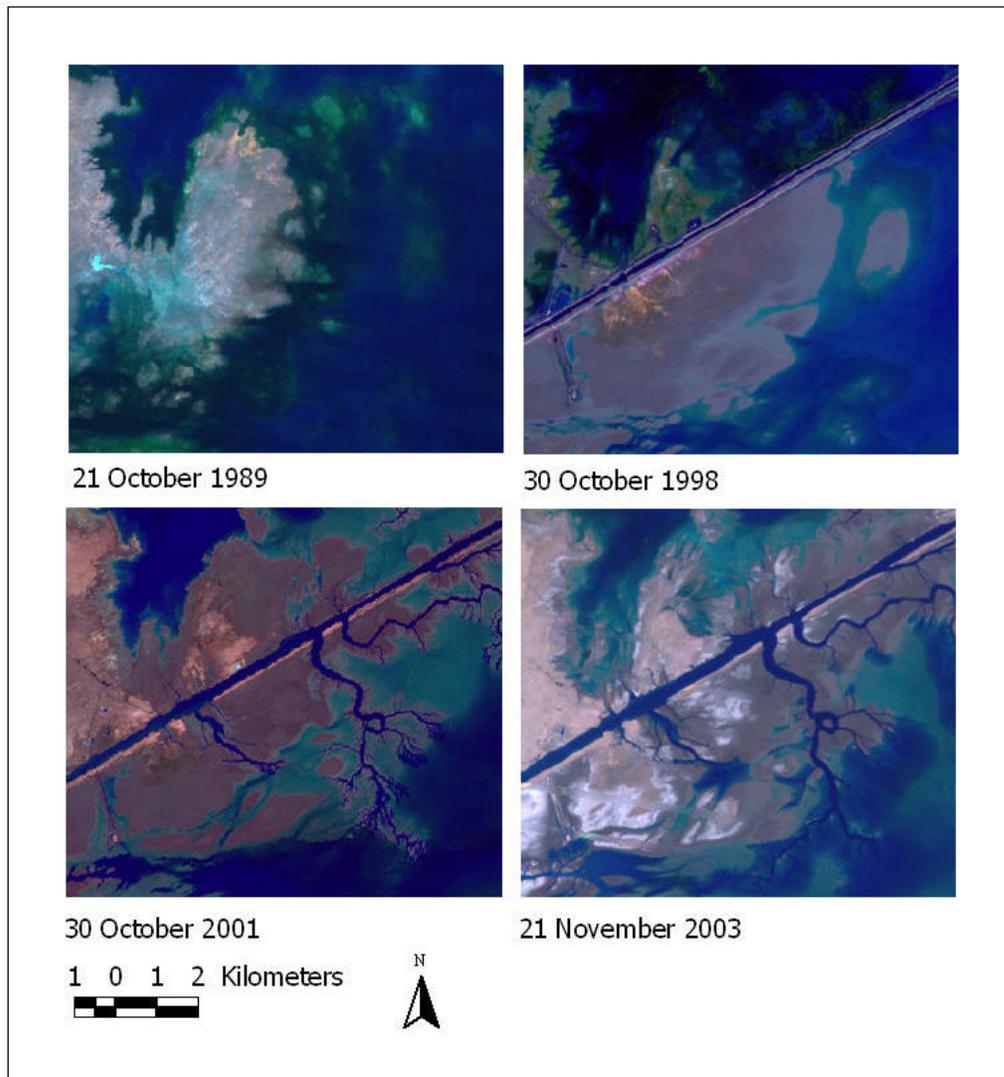


Figure 15: Changes south of the Cholri Dhand

3.3.5. The Extent of the Dhands

Figure 16 shows the Pateji Dhand close to point zero. The acreage of the dhand has decreased significantly between 1989 and 2003. What seems to have happened is that the large connection to other dhands has nearly closed over the years. The dhand is connected to the Tidal Link through a creek behind a breach caused by the 1999 cyclone. At very high tides or floods seawater has entered the dhand through the creek and there is hardly any drainage of the dhand under “normal” conditions. This has led to increase saline levels in the lake, evidence of which is provided by both measurements and the salt crust along the shores in November 2003. Moreover, the loss of aquatic vegetation as visible on the 2003 is most likely caused by this salinisation of the dhand.

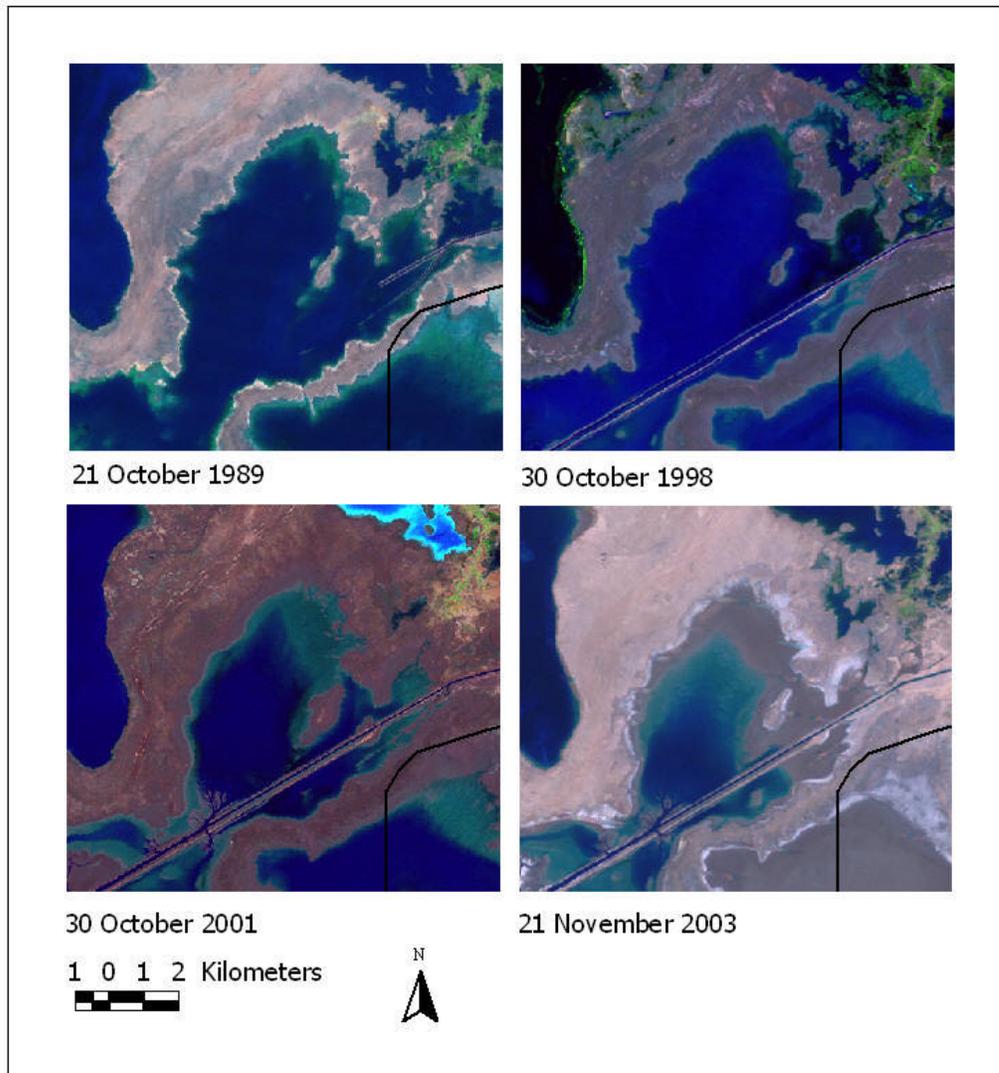


Figure 16: Changes at Pateji Dhand

Figure 17 shows the other three dhands. Similarly, although to a lesser extent, is the decrease in the sizes of the dhands. Most striking about this time series is the water supply and drainage to the systems. The only connection to the dhands is now a small network of creeks, whilst before construction of the structure an open lake system with the Rann of Kutch existed. During floods and high tides salt seawater can enter the dhands now, but the poor drainage conditions under normal circumstances form a serious impediment to drain the water out of the system. This might well result in an increasing salinization of the dhands as confirmed by measurements.

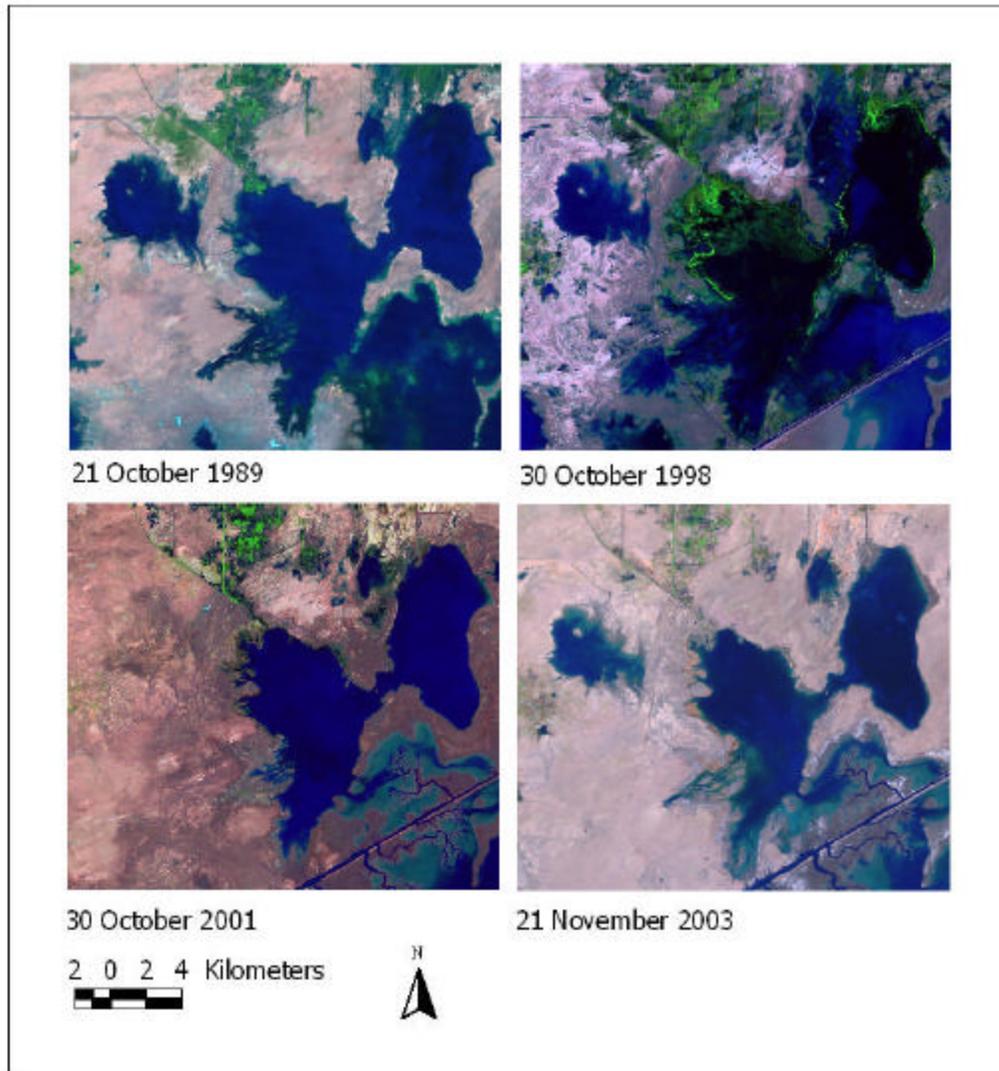


Figure 17: Changes at Memro (Mehro), Sanhro and Cholri dhand

Figure 18 shows an overview of the Rann of Kutch. It seems the water level in October has decreased over the years, although it requires some interpretation to relate this to the Tidal Link and its destruction. During the initial period the Rann of Kutch has been separated from the dhand system through the construction of the Tidal Link. This separation interrupted the flow of fresh or brackish water from the dhand into the Rann and led to a lowering of the water level and an increase in salinity. Later the Rann was reconnected through a network of creeks and the breached Tidal Link. It is likely that in this new hydrological system, changes of the sea water level (tidal movement) are conveyed more quickly and intensively to the dhand and the Rann of Kutch.

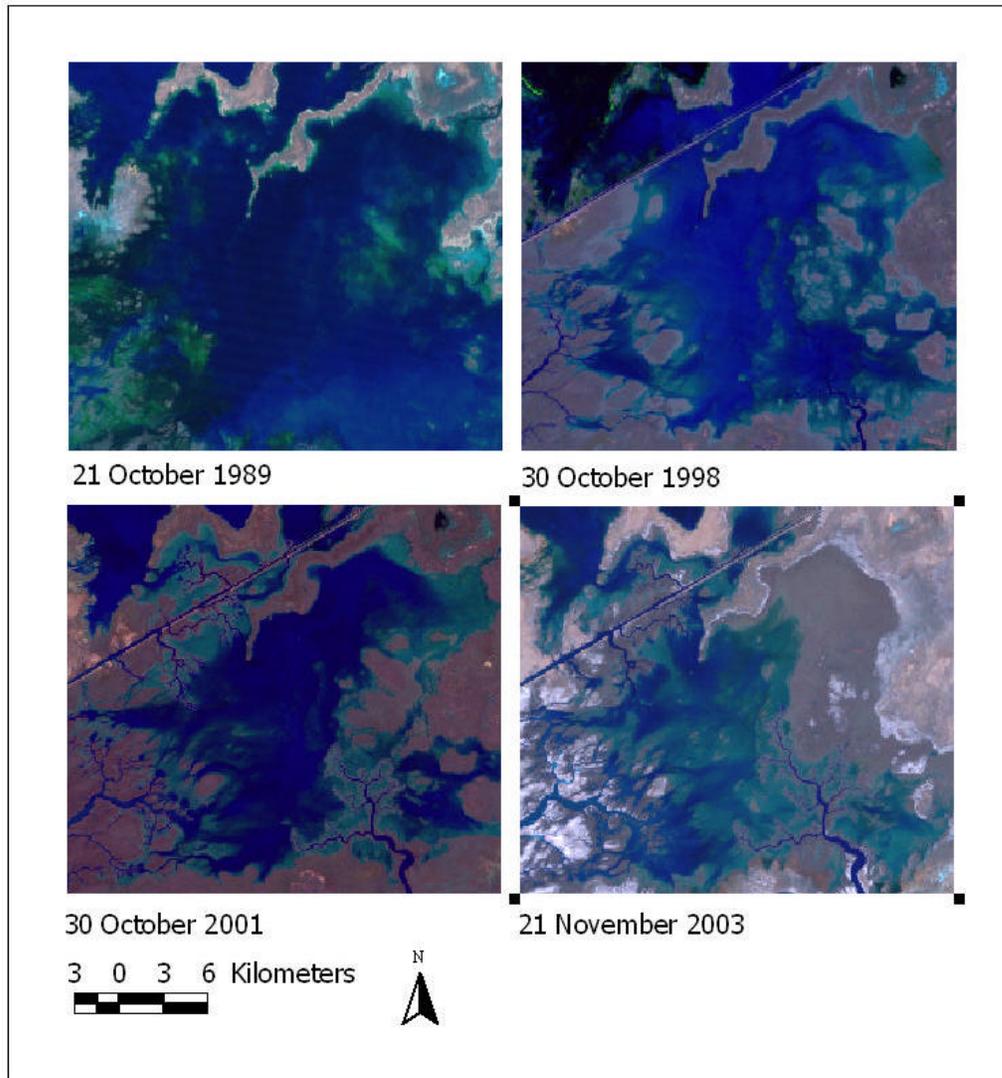


Figure 18: Changes Rann of Kutch

3.3.6. Impact on Agriculture

Figure 19 shows the agricultural area in the North-West corner of the Sanhro Dhand. The images are shown in a 4,5,3 band combination which is specifically well suited for identification of vegetation. Up to 1998 there was agricultural activity right adjacent to the dhand. However after the 1999 cyclone and the development of the creek system the area under cultivation decreased in 2001 and seemed to have disappeared by 2004. Although it needs further research, a likely explanation might be found in the salinity levels of the dhands and the backflow of saline water into the drains.

Livelihoods in the region have suffered from the impacts of these changes. It is important to make a distinction between impacts due to the design itself (difference between 1989 and 1998) and impact due to the collapse of the system (difference between 1998 and 2001).

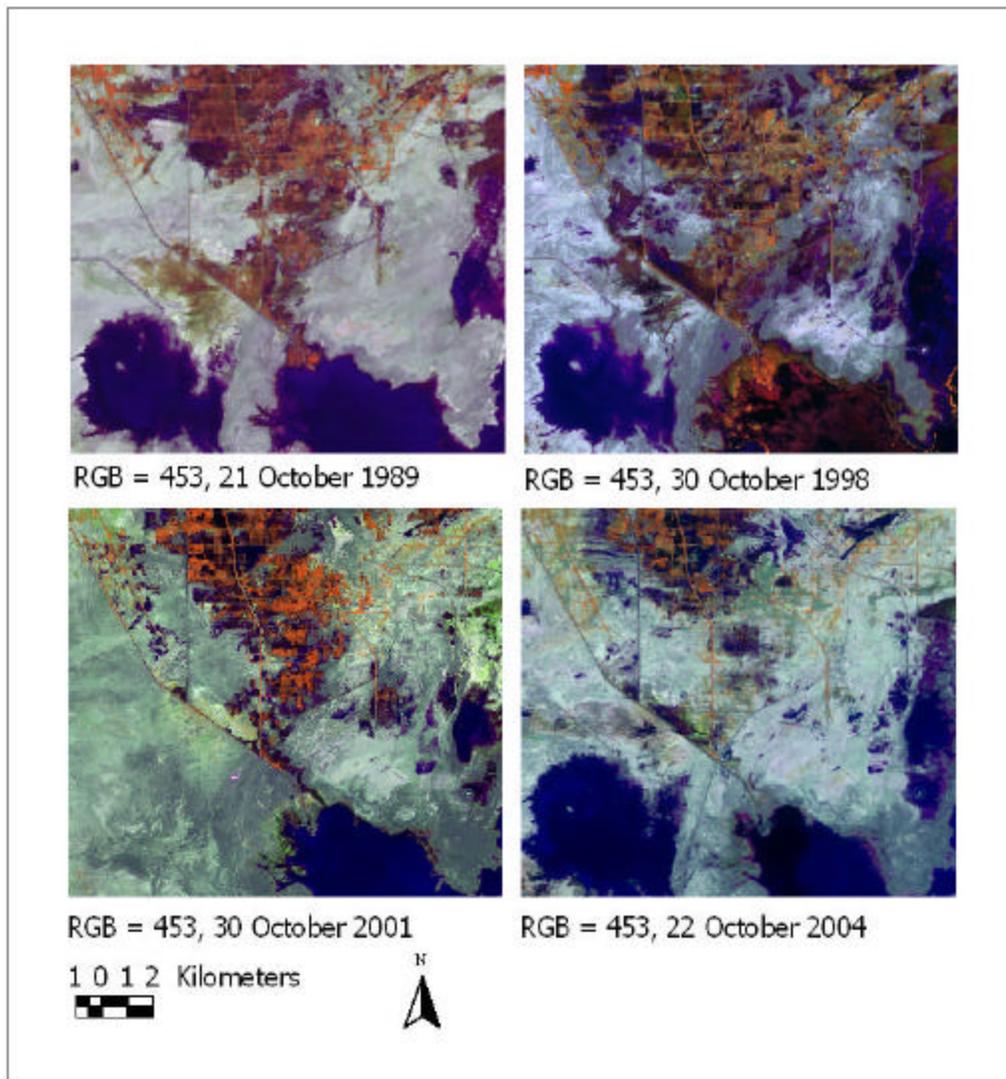


Figure 19: Changes in agricultural acreage north-east of Sanhro Dhand

3.3.7. Salinization

Figure 20 shows a true color image (RGB = 3,2,1) of the entire area. Salt crusts are visible as white spots, e.g. the white salt plain in the North East of the 2001 image. Especially the 2003 image, after the breached Tidal Link system has had a number of year to develop, shows the accumulate salts along the borders of Rann of Kutch as well as some of the dhands. It also shows the changes over time in the reflectance of the water surfaces as a result of salinity levels.

It is interesting and in the context of the inspection important to note that important changes to the ecosystem and therefore to the livelihood of the affected population have occurred as a result of the construction and design of the LBOD prior to the series of unusual weather events. These have been largely positive to the northern dhands and the adjacent agricultural area but negative to the area South – East of the Tidal Link. More severe change occurred due to the collapse of the system which caused additional stress on the vulnerable people in

the region. In other words, enormous adaptation to two major events within five years was required by the people.

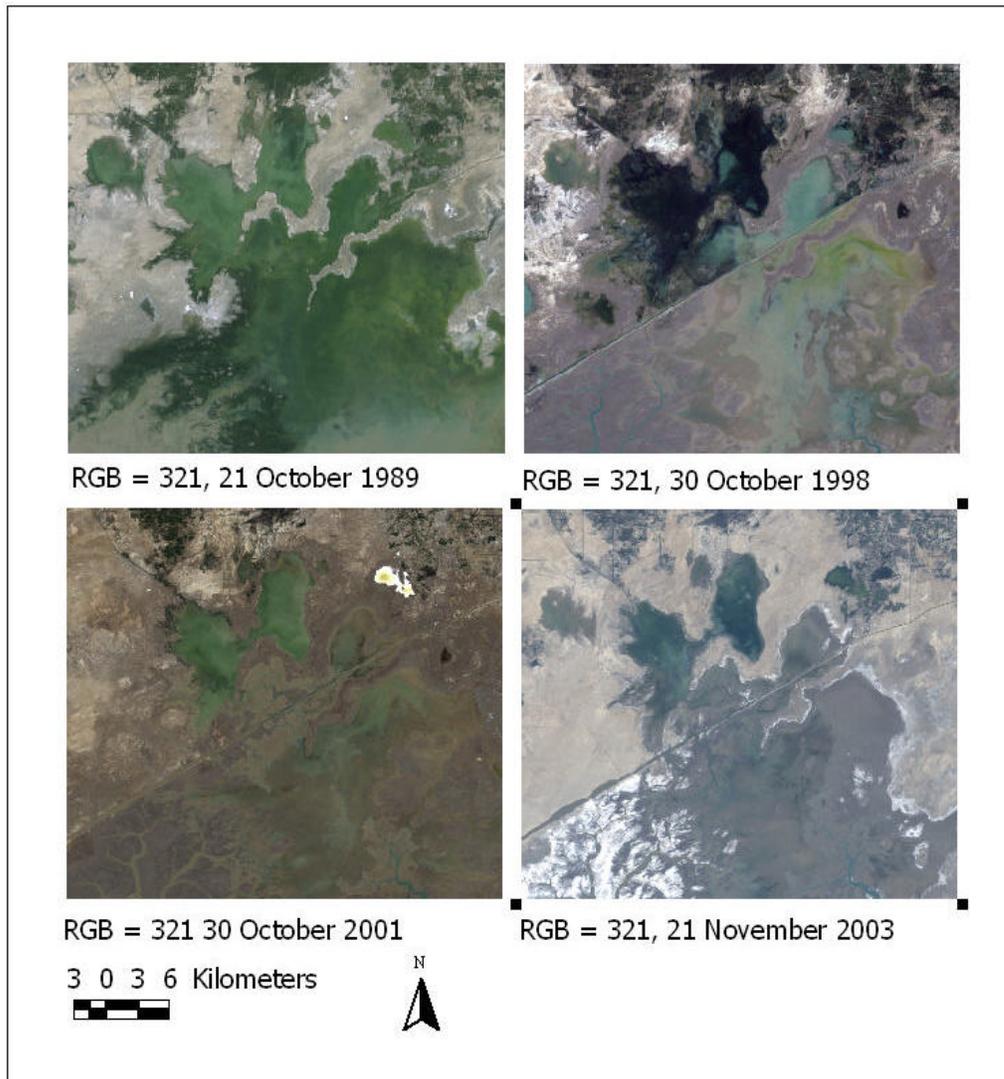


Figure 20: Changes in salinization

3.4. Conclusions

The construction of the Tidal Link outfall system of the LBOD has had great impact on the hydrological system of the area and thus on people living in the region. The following conclusions can be drawn:

- The construction of the Tidal Link separated the Rann of Kutch from the northern dhand system, which initially led to higher variation in water levels in the wetlands.
- The Shah Samando Creek has never served as a drain for the Rann of Kutch or the wetlands. This has changed completely by the construction of the Tidal Link.
- The collapse of the Cholri Weir in June 1998 resulted in an open connection of the dhand system with the Tidal Link. Soon afterwards a very dynamic system evolved on

the salt and fresh water interface. Relative deep creeks developed surrounded by mud flats cause by sedimentation.

- The cyclone of May 1999 had similar effects as the collapse of the weir did at many places along the Tidal Link. The entire system has changed now from an open wetland area, which is inundated the larger part of the year to system with creeks and mud flats around it.
- Consequently the water to and from the dhands is transported through the creeks system. During high tide and floods the sea water from the Arabian Sea enters the dhands through the creeks and the remainder of the Tidal Link and this in combination with a poor drainage system under normal circumstances has led to severe salinization of the dhands. This effect is most clearly visible in the Pateji Dhand where salt crusts cover the shores of the lake.
- The agricultural activities along the shores of the dhands have decreased, and almost ceased to exist in 2004. This could well be explained by the increase salt level in the lake.
- The collapse of the system has not led to a situation similar to that before the LBOD project. The link to the Arabian Sea through the Shah Samando Creek reduced the extent of the wetlands and increased their level of salinity. The system seems to be in an equilibrium stage at the moment.

It is evident that these developments have had severe impact on the livelihoods of the people, both fisherman and farmers, who depend on the resources of this particular system.

It is relevant to make a distinction between the impact of the LBOD project prior and after the collapse of the Cholri Weir and the destruction of the embankments. The impact of the first period should be considered as an impact of the design of the system itself: how people are affected by the LBOD project. The impact of the second period, the collapse of the system, can be considered a result of the poor construction of the entire system.

In terms of the response to the Requesters' claims, it is important to make this distinction between the impact as a result of the design itself and as a result of the faulty construction.

In summary, the following conclusions can be drawn based on the Remote Sensing analysis:

Remote Sensing offers the opportunity to compare spatially the situation prior and after the LBOD project in an unbiased manner.

It is important to make a distinction between the impact of the LBOD project in itself and the impact of the collapse of the system. The first one is related to the design, and the second, to the construction works.

The system as designed, had a major impact on the environment and thus on the people living in the area. The extent of the wetland areas, mainly to the South – East of the Tidal Link, has been reduced due to the construction of the embankments. The Rann of Kutch and the dhands were separated. However, there are indications that the dhands became less saline (increasing the biological productivity) and that agriculture benefited.

The collapse of the system has destroyed the equilibrium of the dhands and induced more negative changes. It had a major impact on the environment and the people living in the area.

The Shah Samando Creek has never served as a drain for the Rann of Kutch and the wetlands prior to LBOD. This has changed completely by the construction of the Tidal Link.

Since the collapse of the Tidal Link a new system has evolved, completely different from the pre-LBOD situation. However, at the moment, the new system seems to be in an equilibrium stage, except the lower part of the Tidal Link where severe erosion continues.

References

Chow, V. T. Maidment, D. R. and Mays, L. W. 1988. Applied Hydrology, McGraw-Hill, New York, U.S.A.

Mitchell, T.D., Carter, T.R., Jones, P.D., Hulme, M., New, M. 2003: A comprehensive set of high-resolution grids of monthly climate for Europe and the globe: the observed record (1901-2000) and 16 scenarios (2001-2100). Journal of Climate.

World Bank. 2005. Pakistan, review of the performance of the left bank outfall drain stage I. Report of the World Bank International Panel of Experts.

WAPDA. 2003. Report on LBOD performance in 2003 rains.

Droogers, P., and G.W. Kite, 2002. Remotely sensed data used for modeling at different hydrological scales. Hydrological Processes 16: 1543-1556.

Droogers, P. 2004. Adaptation to climate change to enhance food security and preserve environmental quality: example for Southern Sri Lanka. Agricultural Water Management 66: 15-33.

Janssen, L.L.F. (ed.). 2000. Principles of Remote Sensing. ITC Educational Textbook Series: 2. ITC Enschede, The Netherlands.

Internet Resources

http://www.cru.uea.ac.uk/~timm/grid/TYN_SC_2_0.html

<http://www.met.gov.pk/>

Annex D: Biographies

Panel Members

Ms. Edith Brown Weiss was appointed to the Panel in September 2002 and is an outstanding legal scholar who has taught and published widely on issues of international law and global policies, including environmental and compliance issues. She is the Francis Cabell Brown Professor of International Law at Georgetown University Law Center, where she has been on the faculty since 1978. Before Georgetown, she was a professor at Princeton University. Ms. Brown Weiss has won many prizes for her work, including the Elizabeth Haub prize from the Free University of Brussels, the International Union for the Conservation of Nature (IUCN) for international environmental law, and the 2003 American Bar Association Award in recognition for distinguished achievements in Environmental Law and Policy. She has also received many awards for her books and articles. She served as President of the American Society of International Law and as Associate General Counsel for the U.S. Environmental Protection Agency, where she established the Division of International Law. Ms. Brown Weiss is a member of many editorial boards, including those of the American Journal of International Law and the Journal of International Economic Law. She has been a board member, trustee, or advisor for the Japanese Institute for Global Environmental Strategies, the Cousteau Society, the Center for International Environmental Law, and the National Center for Atmospheric Research, among others. Ms. Brown Weiss has been a Special Legal Advisor to the North American Commission on Environmental Cooperation. She has been a member of the U.S. National Academy of Sciences' Commission on Geosciences, Environment, and Resources; the Water Science and Technology Board; and the Committee on Sustainable Water Supplies in the Middle East. She is an elected member of the American Law Institute, the Council on Foreign Relations, and the IUCN Commission on Environmental Law. Ms. Brown Weiss received a bachelor's of arts degree from Stanford University with Great Distinction, an LL.B. (J.D.) from Harvard Law School, a Ph.D. in political science from the University of California at Berkeley, and an Honorary Doctor of Laws from Chicago-Kent College of Law.

Mr. Tongroj Onchan was appointed to the Panel in September 2003. He has a Ph.D. in agricultural economics from the University of Illinois. Professor Onchan taught on the Faculty of Economics at Kasetsart University in Thailand for 26 years, including a term as Dean. He later served as vice president of Huachiew Chalermprakiat University; then joined the Thailand Environment Institute (TEI) as vice president. In 1998, Mr. Onchan was appointed president of TEI. He helped establish and was appointed president of the Mekong Environment and Resource Institute (MERI) in 2000. He has served as advisor to the Prime Minister and to the Minister of Science, Technology and Environment, as member of the National Environmental Board, chairman of the National EIA Committee, chairman of the Committee on the Preparation of State of the Environment Report for Thailand, and member of the National Audit Committee. Mr. Onchan is on many editorial boards, among them the Asian Journal of Agricultural Economics and the International Review for Environmental Strategies. He has consulted for a number of international organizations, including the Asian Productivity Organization, ESCAP, the World Bank, the Asian Development Bank, the Food and Agriculture Organization, the International Labor Organization, USAID and the Ford

Foundation. He has been project director of over thirty research projects and author or co-author of numerous technical and research papers on rural development, natural resources and environmental management. Currently, he serves in several capacities: chairman of the Board of Directors of the MERI, member of National Research Council for economics, and a director of the International Global Environment Strategy (IGES) based in Japan. Mr. Onchan was appointed as eminent person to serve as a member of the Asia and Pacific Forum for Environment and Development (APFED).

Mr. Werner Kiene was appointed to the Panel in November 2004. He holds a Masters of Science degree and a Ph.D. in Agricultural Economics from Michigan State University. He has held leadership positions with the Ford Foundation and German Development Assistance. In 1994, Mr. Kiene became the founding Director of the Office of Evaluation of the United Nations World Food Programme (UN WFP). He was the World Food Programme Country Director for Bangladesh from 1998 through 2000 and also served as UN Resident Coordinator during this period. From 2000 to 2004 he was a Representative of the UN WFP in Washington, D.C. Mr. Kiene's focus has been on the design, implementation and assessment of sustainable development initiatives. His professional writings have dealt with issues of rural poverty and social services delivery; food security, agricultural and regional development; emergency support and humanitarian assistance; international trade and international relations. Mr. Kiene is involved in professional organizations such as the American Evaluation Association; the Society for International Development; the American Association for the Advancement of Science; and the International Agriculture Economics Association.

* * * * *

Consultants

Mr. Peter Droogers is an expert on integrated water resources management at different spatial scales with emphasize on water for food issues, climate change, decision support systems, simulation modeling in combination with data mining and remote sensing. He earned his Ph.D. from Wageningen Agricultural University, Netherlands. Mr. Droogers has over 15 years of experience working in the Netherlands and overseas (as a resident in Sri Lanka and Turkey). Non-resident assignments included Cambodia, the Gambia, France, India, Iran, Niger, Pakistan, South Africa, Spain, and USA. He conducted research at various institutions including Wageningen University, International Water Management Institute, and FutureWater. Mr. Droogers is part-time lecturer at several universities and has written over 100 publications of which 50 appeared in peer-reviewed journals. He is reviewer for a number of journals and is one of the associate reviewers of the Journal of Hydrology.

Mr. Robert Goodland is a tropical ecologist and served the World Bank as environmental adviser from 1978 until his retirement in 2001. He advised the independent Extractive Industries Review of the World Bank Group's oil, gas and mining portfolio from 2001 to 2004. He serves as Metropolitan Chair of the Ecological Society of America, and Past President of IAIA. Mr. Goodland has published approximately 30 books on environment and

sustainability of major infrastructure projects. He earned his Ph.D. from McGill University in Montreal.

Mr. Charles B. Mehl, a US national, visited India as a high school exchange student in 1969 and majored in South Asian history and religions in College. As a Peace Corps Volunteer in Nepal from 1974 to 1976, Mr. Mehl helped design and build gravity flow drinking water systems. For his graduate studies, Mr. Mehl majored in the sociology of development, with minors in Southeast Asian studies (Thailand emphasis) and international agriculture. After completing a Ph.D. in 1985, he moved to Bangkok, and has lived in Thailand and worked in the region since then. He specializes in social aspects of natural resource management, in particular land tenure and other land relations and forest management; in institutional organization; in surveying, monitoring and evaluation methods; and in cultural aspects of development. His recent studies include development of indicators of livable communities for local governments in Thailand, institutional arrangements for land use planning in the area surrounding the new international airport in Bangkok, and local environmental planning. Mr. Mehl currently works for the Mae Fah Luang Foundation which carries out social and economic development and cultural work in northern Thailand, and as research director for a museum on the history and politics and the effects of illegal drugs.

Mr. Hans W. Wolter is a specialist in water resources management, in particular agriculture water use, land & water interactions, institutional aspects including participatory approaches and hydraulic construction. He has a Ph.D. in water resource planning and irrigation. He started his career with a consulting firm, later he became lecturer at the German Development Institute, Berlin and Technical Adviser at the German Bank for Reconstruction (KfW) followed by a five years overseas assignment to Jordan. He then worked for GTZ as the Head of the Section Irrigated Agriculture during which period he was seconded for four year to the World Bank. In 1994 he joined FAO as the Chief of the Water Management Service. He was promoted to Director of the Land and Water Division in 1998. During this period he worked on innovative concepts of integrated land and water use. He traveled extensively mainly to African and Asian countries, published books and articles on water use aspects and represented FAO in international meetings. Mr. Wolter retired from FAO in 2001. He then became Coordinator of the Secretariat of the Dialogue on Water, Food and Environment hosted by the International Water Management Institute (IWMI) in Sri Lanka. The Dialogue has been set-up to promote integrated water management and to build bridges between the agricultural and the environmental communities on water use. Mr. Wolter left the Dialogue Secretariat in 2003 and works now as a part-time consultant.