

Climate Change Risks and Vulnerabilities of Badin District in Sindh Province, Pakistan



OXFAM
Novib



Study carried out by Zulfiqar Rao and Irfan Maqbool

July 2014

Design and layout: Lowil Espada

Edited by Don Tartaglione

Images sourced by Katy Wrench

An aerial photograph showing a large area of flooding. In the center, a group of people has established a makeshift settlement on a patch of dry ground. They are using wooden planks and other materials to create platforms and structures. There are several people, some with children, and some animals like cows and a dog. The surrounding water is muddy brown, and there are some green plants scattered throughout the flooded area.

Acknowledgements

A number of contributors provided valuable input during the preparation of this report. We would like to thank the Sindh Coastal Development Authority, the District Government of Badin, NDMA, PDMA Sindh, Laar Humanitarian and Development Program, and the Global Change Impact Studies Center. Our Colleagues at Oxfam Novib provided wonderful support by facilitating overall coordination and management during the process. We sincerely thank all the men and women that spared their time and participated in the community group discussions in different areas of Badin.

Contents

<i>i</i>	Acknowledgements
<i>iii</i>	Acronyms and Abbreviations
<i>iv</i>	Local Terms Used
<i>v</i>	Foreword
<i>vi</i>	Executive Summary
<hr/>	
1	Introduction
<hr/>	
1	Methodology
<hr/>	
3	Description of the Study Area
<hr/>	
3	Geo-Administrative
4	Demographic Aspects
4	Economy and Livelihoods
5	Poverty and Human Development
6	Climate Situation
7	Disaster Vulnerability
<hr/>	
8	Findings
<hr/>	
8	Key Risks and Vulnerabilities
12	Indigenous Key Coping Mechanisms
15	On-going Programmes and Efforts to Address CCA Concerns
<hr/>	
24	Conclusion and Recommendations
<hr/>	
24	Conclusions
25	Recommendations
28	Annex
28	Annex 1: List of Villages Visited and Key Informants

Acronyms and Abbreviations

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
CC	Climate Change
CCA	Climate Change Adaptation
CBDRM	Community Based Disaster Risk Management
DCO	District Coordination Officer
DDMA	District Disaster Management Authority
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EDO	Executive District Officer
FAO	Food and Agriculture Organization
FGD	Focus Group Discussions
GDP	Gross domestic Product
GOP	Government of Pakistan
GOS	Government of Sindh
IUCN	International Union for Conservation of Nature and Natural Resources
LBOD	Left Bank Outfall Drain
LHDP	Laar Humanitarian and Development Program
MAF	Million Acre Feet
NCCP	National Climate Change Policy
NDMA	National Disaster Management Authority
NGOs	Non-Governmental Organizations
PDMA	Provincial Disaster Management Authority
SCDA	Sindh Coastal Development Authority
SUPARCO	Space and Upper Atmospheric Research Organization
TMA	Tehsil Municipal Administration
WAPDA	Water and Power Development Authority
WWF	World Wide Fund for Nature

Local Terms Used

<i>Deh</i>	A little bigger than a village- several Goths constitute a Deh
<i>Dhand</i>	Shallow water lakes that formed in a depression
<i>Goth</i>	The smallest unit of settlement which can be equated with a hamlet or village
<i>Hari</i>	Tenant or peasant
<i>Kamdar</i>	The supervisor or manager for the landlord who supervises the tenants and makes decisions when he's absent
<i>Katcha</i>	The area on the riverbank that has fertile silt. The area is highly prized for cultivation Title for this land was not traditionally allocated to anyone and in theory it was used on a first come first served basis
<i>Kharif</i>	Summer cropping season
<i>Rabi</i>	Winter cropping season
<i>Seth</i>	Wealthy or influential owner
<i>Taluka</i>	Administrative tier below the district
<i>Zamindar</i>	Landlord

Foreword

The study on ‘Climate Change Risks and Vulnerabilities of Badin District in Sindh Province, Pakistan’ is part of a one-year project implemented by ADPC and Oxfam Novib in three Union Councils (Kadhan, Ahmed Rajo and Bhugra Memon) of Badin. The project seeks to implement a set of structural and non-structural measures with an underlying objective of enhancing the resilience of coastal communities to climate change and other environmental hazards. One important component of the project is the mainstreaming of ecosystem-based Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) considerations into public-sector development plans and programs at the district and provincial level.

Badin is one of the most vulnerable districts in Sindh Province. Local communities have low adaptive capacity with limited knowledge on climate change issues. Similarly, the land degraded by the Left Bank Outfall Drainage (LBOD), and the recurrent sea-erosions have affected the natural ecosystem of the area in many ways. Notably, the sea intrusion has worsened the situation by turning the cultivable land into barren patches. Thus, limiting the livelihood options for local communities.

The study builds on an earlier project implemented by Oxfam Novib by looking deeper into a range of vulnerabilities. Specifically, how local communities are impacted by these vulnerabilities over a period of time. It also recommends measures that can be initiated by development partners and local and provincial governments.

The project implements the recommendations in collaboration with local communities and district authorities. Oxfam Novib and ADPC believe that the amount of development planning and implementation processes either increase or mitigate vulnerabilities of hazard-prone communities. Therefore, it is important that DRR and CCA considerations become an integral part of the public-sector development policy, strategy, programs and plans, so the outcomes can benefit even the most vulnerable.

Executive Summary

The study was conducted with reference to three coastal Union Councils (UCs), made up of over 36 villages in two different Talukas (sub-districts) of Badin District. Here, ADPC and Oxfam Novib, Pakistan, have initiated a one-year project on community-based Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA).

It was an exploratory study that focused largely on the qualitative aspects. It generated primary information through Focused Group Discussions (FGDs) with communities, and Key Informants Interviews (KII) with independent professionals and relevant officials in the federal, provincial and district governments. Desk review of existing literature on the subject was undertaken for additional information.

Badin is exposed to sea intrusion and cyclones. Climate change and extreme events create risks and vulnerabilities in a number of key areas within the local ecosystem and livelihood patterns. Important areas are discussed further in the 'findings' section of this report.

Climate change phenomena have been affecting local agriculture. According to the data from the District Revenue Office of Badin, the cropped area has reduced from 203,000 acres in 2001–2002 to 153,000 acres in 2005. The villages in Ahmed Rajo and Bhugra Memon are affected the worst. According to farmers, the sea-erosion has turned more than 85,000 acres of cultivable land into barren patches.

The coastal areas of Badin, along with neighbouring Thatta district, were home to the best breeds of buffalo, red cows, and camels. However, erratic climate patterns during the past decade have caused flooding, drought, and sea intrusion thereby depleting sources of grass and fodder. The successive floods in 2010 and 2011 have only worsened the situation for large livestock rearing in the coastal areas of Badin.

As for livelihood sources, more than 15,000 people in three UCs depend on fishing. Improper drainage schemes, especially the Left Bank Outfall Drainage (LBOD) and the Right Bank Outfall Drainage (RBOD), have exacerbated sea intrusion and environmental degradation in the fishing areas of Badin and Thatta districts. Wetlands drying up in Badin are making local communities more vulnerable.

Badin has two forests, but the coastal UCs of Ahmed Rajo and Bhugra Memon have areas that lie completely barren. This is due to sea intrusion, scarcity of fresh water, rising temperature, frequent floods, and cyclones that inundate and wash away whatever vegetation may have started to grow. Similarly, a rise in sea levels and the reduction of fresh water flow and its associated silt deposit has affected the mangrove forest on the Badin coastline.

Over the years, the coastal communities have acquired a basic understanding of CCA and DRR. Local coping mechanisms include building houses on raised platforms, carving embankment-like ridges around their villages to prevent floodwater entry, storing key grains for food shortages, and getting animals vaccinated before the start of the monsoon season. The provincial government focus remains on emergency preparedness and response. Climate change matters are assigned to the Ministry of Environment and Alternative Energy.

This study presents a set of recommendations that can mitigate the affects of climate change-induced risk and vulnerabilities in coastal areas. These recommendations include the institutionalization of DRM planning at village, district and provincial levels; capacity building of communities and government officials on DRM and CCA; and mainstreaming of DRR and CCA into provincial and local development planning processes, etc.

FIGURE 1: MAP OF BADIN DISTRICT



Source: Badin Climate Change Strategic Plan 2013, Laar Humanitarian and Development Program (LHDP)

Introduction

ADPC and Oxfam Novib Pakistan have begun implementing a one-year (March 2014–February 2015) project in the coastal areas of Badin District in Sindh Province. At ADPC, it is part of a regional program on Mainstreaming Disaster Risk Reduction into Development (MDRD) in the Asia-Pacific region supported by the Government of Australia, Department of Foreign Affairs and Trade.

The project seeks to implement a set of structural and non-structural measures in three Union Councils (UCs) of Badin District with an underlying objective of enhancing the resiliency of the coastal communities to climate change and other hazardous phenomena. The project includes three main activities i.e., research, capacity building, and advocacy on Climate Change Adaptation (CCA) together with implementation of structural mitigation measures at the community level to increase their resilience and reduce vulnerabilities.

The study aims to expose vulnerabilities that affect the ecosystem, explore local coping mechanisms, and the government's endeavours to address climate change concerns. The study focuses on the following:

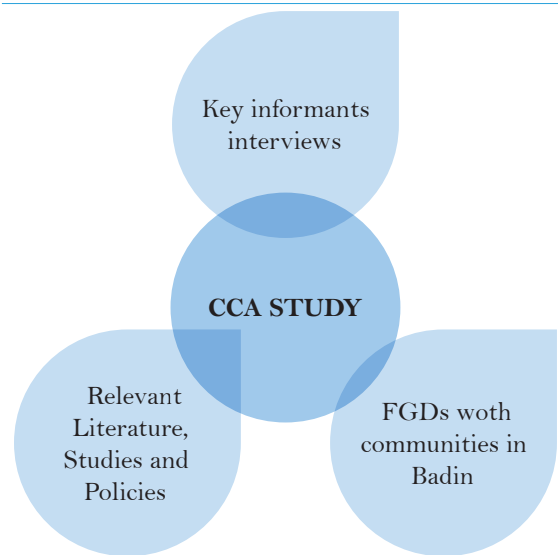
1. Key risks and vulnerabilities that may be attributed to climate change phenomena;
2. Types of risks that may affect the coastal ecosystem as well as the livelihood of local communities;
3. Indigenous coping mechanisms of the target communities;
4. The government's efforts with regard to addressing the climate change and ecosystem concerns in the coastal areas of the country;
5. Recommendations for policy-making institutions, development partners and other relevant stakeholders.

Methodology

The study is a qualitative probe into CCA related risks and vulnerabilities of the coastal communities in terms of their livelihoods and ecosystem in the three UCs of Ahmed Rajo, Bhugra Memon, and Khadan. Consequently, only open ended qualitative information collection tools were employed to collect primary data through Focus Group Discussions (FGDs) with communities and Key Informant Interviews (KII) with relevant professionals in NGOs and figures in federal, provincial, and district governments.

Information collection tools were developed using available literature. A considerable amount of secondary sources have also been referred to in order to collect the information.

FIGURE 2: STUDY APPROACH



For primary data collection, two FGDs were conducted in each of the three UCs of Badin. Oxfam Novib’s local partner in Badin, known as Laar Humanitarian and Development Program (LHDP), supported the FGDs. The community groups represented those involved in agriculture, fishing, and daily wage labour.

In addition, six in-depth interviews with specialists and relevant personnel were conducted through KIIs in Islamabad, Karachi, and Badin. Meetings with ADPC experts and relevant team members from Oxfam Novib aided this study.

Source: ADPC



Source: ADPC

Description of the Study Area

Geo-Administrative

Badin district is located in swampy deltaic land east of the Indus River. The total area of the district is 6,726 square kilometers. Badin was given district status in 1975, and is comprised of five Talukas Viz: Badin, Matli, Shaheed Fazal Rahu (previously named Golarchi), Talhar, and Tando Bago. The district has 46 Union Councils with 14 revenue circles, 111 Tapas and 535 dehs. The population of the district was reported as 1.1 million in the National Census of 1998; and was projected to be 1.6 million in 2011. Well over 80% of the inhabitants live in rural areas.¹

Since 2010, the province of Sindh is without a functioning elected local government system. The Deputy Commissioner, a national government official, heads the district in the absence of local government. At the lower level, a Deputy District Officer (Revenue) in addition to Taluka Municipal Administrations is at the head of the taluka.

District headquarters are located in the city of Badin and is well connected with the rest of the province through roads and railway lines. Cellular phones are the main source of communication even though telecommunication services are available.

The district is a part of the Lower Indus plain formed by Indus River alluvial deposits. Being a vast alluvial plain, its land is uniform in character and is not diversified by hills or rivers. The general elevation of the district is about 50 meters above sea level.

The district has a moderate climate, and is tempered by sea breeze that blows for eight months of the year from March to October, making the summer weather cooler. The climate in the summer is generally moist and humid. The cold weather in Badin starts at the beginning of November, when a sudden change from a moist sea breeze to dry and cold winds cause an immediate fall in temperature. During the monsoon period, the sky is cloudy, but there is little precipitation. Cyclones and floods have always frequented the area.

¹ Development Statistics of Sindh, Bureau of Statistics, Gov't of Sindh, 2011

Demographic Aspects

As mentioned before, the population of the district was projected to be 1.6 million in 2011. The male and female composition was 52.5% and 47.5% of the total population respectively. The 82% of urban and 79.89% of rural population is Muslim while 18.85% are Hindus. The population density stood at 168/km and it grew at 2.26%.² The average number of households (HHs) in the village is 57 while there is an average of seven people per HH.³ Sindhi in Vicholi and Kutchi dialects is the primary language in the district, spoken by 74% of the total population in the district. Other prominent languages are Punjabi (17%), Urdu (5%) and Balochi (2%) and others (2%).

Economy and Livelihoods

Badin can be categorized into two distinct economic zones. One is purely agricultural and the other mixes both fishing and agriculture. The upper part of the district starting from Matli, Talhar and Tando Bago relies on farming. The coastal areas i.e., Golarchi (Shaheed Fazil Rahoo) and Badin rely on both agriculture and fishing. Around 80% of men in the coastal UCs of Badin are involved in fishing as a means of livelihood. Due to reduced livelihood opportunities, the poverty has increased from 1987–2006. Those below the poverty line have increased from 55% to almost 70%.⁴

Most of Badin's areas were used for growing rice paddies. Today, sugarcane is the major cash crop. The land is irrigated by water coming from Sukkur and Kotri barrages. The irrigation network is mainly comprised of Gooni, Phulali, Akram Wah and Nasir canals. The total irrigation supply is 15,208 cusecs for the command area of 0.603 million hectares. According to the data from the Statistical Office of Badin, the total cultivable area on these canals is 2.8 million acres. Out of 12,000 watercourses, only 2000 watercourses have been lined up to 30% length. The net-cropped area is 182,512 hectares, mainly because of the lack of irrigation water. Badin district crop statistics for 2002–2003 indicate cotton cultivation on 6427.7 hectares (ha), sugarcane on 50,386 ha, rice on 63,839 ha, wheat on 29,217.6

² MDG Report Sindh 2012, UNDP

³ Baseline Survey of Coastal Areas of Badin and Thatta, Sindh Coastal Development Authority, Gov't of Sindh 2012

⁴ Understanding Rural Poverty Dynamics, The case of the poorest district in Sindh, SPDC 2008

ha, sunflower on 37,858.5 ha, chillies on 6,167 ha, banana on 2,639.8 ha, other gardens on 2,259 ha and tomato on 4,265 ha.

Badin is one of the richest districts in terms of its natural resources. There are 21 water areas with the potential to catch prawns and lobster and 370 fishponds are spread across 16,500 acres. The livestock population was 1,140,122 in 1998, but declined to 857,501 after the 2003 floods. In 1995, Badin's daily natural crude oil production from four oil fields was recorded at 20,043 barrels in 1995, 20,970 barrels in 1996, and 26,335 barrels in 1997. The height of daily oil production was recorded in 2001 at a record 30,000 barrels. It produces 45% of the total crude oil production in Pakistan.



Source: ADPC

A typical village settlement in Badin District, Pakistan

Poverty and Human Development

The average monthly incomes in the targeted UCs of Badin have been reported as PKR7,500.⁵ However, income disparity is generally high. In terms of the human development index, Badin falls among the 'average' index of 0.628, but in absolute terms the situation is dire. The UNDP MDG Report 2012 shows people are suffering. The prevalence of under-weight children is 47.9%, while only 64% of the children between 12–23 months have received proper immunizations. The infant mortality rate (IMR) remains as high as 87 deaths per 1,000 births, and maternal mortality rate (MMR) at 410 deaths per 100,000 births. The literacy rate

⁵ Socio-economic survey in three UCs of Badin, 2013, LHDP

is reported to be 39%, which broken down is 54% for males and 22% for females. Net school enrolment rate is 41%; of this percentage boys represent 45% and girls 37%. The rate of primary level completion is 18% for females and 45% for males, while overall it's struggling at 32%; and as many as 46% of school age children are out of school in Badin.

Climate Situation

The average rainfall is 125 mm, which occurs mostly in the monsoon period. In summer, it is generally moist and humid while the temperature hits 45°C. The coastal areas observe tropical storms in the months before and after summer. The winter season is short between November and February. All these climatic variables affect crops and human life in the region.⁶

In the last decade, catastrophic floods have ravaged the coastal belt district of Badin in 1999, 2003, 2006 and 2007. Currently, sea levels are increasing by 1 cm at the surface, which is equivalent to 1.2 km at the sub surface level. The sea level has risen by 165 mm since 1850.

6 Sindh CRS: Base Line Survey: Agriculture Information System



Disaster Vulnerability

The district of Badin is exposed to many elemental and human induced hazards. Common natural disasters include cyclones, heavy rainfall, floods and droughts. Human induced disasters include the technical and management related faults vis-à-vis Left Bank Outfall Drain (LBOD) that has wreaked havoc over the local populace and Badin's coastal eco-system. The LBOD was constructed during 1984–1997 to relieve water logging and salinity in 1.3 million acres in Mirpurkhas, Sanghar, and Nawabshah districts.⁷

The LBOD project included a Tidal Link Canal to carry the saline drainage effluent from a spinal drain 42 km across the coastal zone to the Arabian Sea. The dwellings, hamlets and villages that are situated in close proximity to the Arabian Sea (and LBOD) are frequently the subjects of recurrent disasters. The table below gives us an idea on Badin's vulnerability to disasters and how their frequency has increased in just over a decade.

TABLE 1: PAST DISASTERS IN BADIN

No.	Disaster	Year	Severity	Worst Affected Areas
1	1 Cyclone	1964–65	High	Union Council Ahmed Rajo, Union Council Bhugra Memon, Union Council Seerani, Union Council Mithi III, Union Council Khoski
	Heavy Rainfall	1973	Medium	Taluka Badin, Taluka Shaheed Fazil Rahoo
3	Flood	1976	High	Ahmed Rajo, Bhugra Memon, Khorwah, Tarai, Garho, Seerani
4	Flood	1988	Medium	Ahmed Rajo, Bhugra Memon
5	Flood	1994	High	Entire District
6	Cyclone	1999	High	Entire District particularly near the coastal belt
7	Earthquake	2001	Medium	Taluka Badin, Taluka Shaheed Fazil Rahoo
8	Flood	2003	High	Taluka Badin, Taluka Shaheed Fazil Rahoo
9	Cyclone	2007	Medium	Union Council Ahmed Rajo, Union Council Bhugra Memon, Union Council Khorwah, Union Council Tarai, Union Council Garho,
10	Heavy Rainfall	2007	Medium	Taluka Badin, Taluka Shaheed Fazil Rahoo
11	Flood	2010	High	Taluka Badin, Taluka Shaheed Fazil Rahoo
12	Flood	2011	High	Taluka Badin, Taluka Shaheed Fazil Rahoo

Source: Badin District DRM Plan, UNDP and District Gov't Badin, 2008

⁷ World Bank Report of Experts on LBOD, 2005

Findings

Pakistan is negatively affected by climate change due to its location, reliance on agriculture and water resources, the population's weak adaptive capacity, and novice emergency system. Badin's unique location makes it susceptible to many climate related hazards as identified in Pakistan's climate Change Policy.⁸ Some of those are as follows:

- Projected recession of the Hindu Kush-Karakoram-Himalayan (HKH) glaciers due to global warming and carbon soot deposits from trans-boundary pollution sources, threatening water inflows into the Indus River System (IRS);
- Increased siltation of major dams caused by more frequent and intense floods;
- Rising temperatures resulting in enhanced heat and water-stressed conditions leading to reduced agricultural productivity;
- Further decrease in the already scanty forest cover, from too rapid change in climatic conditions to allow natural migration of adversely affected plant species;
- Increased intrusion of saline water in the Indus delta, adversely affecting coastal agriculture, mangroves and the breeding grounds of fish;
- Threat to coastal areas due to projected sea level rise and increased cyclonic activity due to higher sea surface temperatures;
- Increased stress between upper riparian and lower riparian regions in relation to sharing of water resources;

Key Risks and Vulnerabilities

Badin's exposure to climate change phenomena creates a variety of risks and vulnerabilities. Some of those important areas have been discussed here based on information from secondary and primary sources.

Agriculture Sector

The agriculture sector in Pakistan plays a pivotal role in providing food security for its people. More than 47% of the population is dependent on this sector. Climate change threatens agriculture through changes in temperature and precipitation. It is projected that temperatures will increase by 3°C by 2040 and

8 National Climate Change Policy 2012

5°C to 6°C by the end of this century.⁹ In the case of Badin, which lies at the tail of IRS, this has resulted in fresh water systems diminishing, and an overall reduction in water availability, not only for agriculture, but also for wildlife in the coastal belt.

Badin's cultivated area consists of 310,457 hectares (ha) irrigated by four canals i.e., Gooni, Phulali, Akram Wah and Nasir. Out of the total cultivated area, unplanted/fallow areas account for 259,000 ha (83.42%). In 2001–2002, the net area sown was recorded to be only 203,000 ha. The net cropped area in 2004–2005 was much less at only about 155,428 ha; 76% of the total area cropped is sown in the Kharif season and about 24% in the Rabi season.¹⁰

Due to rising temperatures, the sea level has increased and the situation is further exacerbated, because less freshwater flows from rivers into the deltaic area. Freshwater flow has reduced from 150 million acre-feet (MAF) to 10-15 MAF. This situation caused sea intrusion thereby eroding agricultural lands, wetlands

9 The Impact of Climate Change on Major Agricultural Crops: Evidence from Punjab, Pakistan

10 Climate Change and its impact on Green Sectors, LHDP, Badin



and settlements. The adverse impact and loss of agriculture land was visible at the time of the field visits to Badin's coastal villages of Golo Mandhro, Shaikh Keerio Bhandari, and Haji Hajjam. According to the data from Badin's district Revenue Office, as quoted in the report of LHDP on climate change effects, the cropped area has reduced from 203,000 ha in 2001–2002 to 153,000 ha in 2005. Locals report worse conditions in villages located in the UCs of Ahmed Rajo and Bhugra Memon, where around 51,000 and 38,000 acres of cultivable land have been lost because of sea intrusion respectively.

Livestock

The rise in temperature, scarcity of fresh water, salinity of ground water, frequent flooding and cyclones has negatively affected cultivable land, pastures, and rangelands. The population's frequent inundation and displacement has resulted in livestock losses, especially in the coastal UCs of Badin.

The local population has traditionally owned buffalo and cows, which indicates there was sufficient water and fodder available in the past. Coastal areas of Badin, along with the neighboring Thatta district, were home to the best breeds of *Kundhi* buffalo, red Sindhi cows, and Sakri/Khari camels. In the last decade, the areas have seen erratic climate changes that have frequently caused flooding, drought, and constant sea intrusion. These disasters remove sources of grass and fodder, and make it difficult to keep livestock. The successive floods in 2010 and 2011 worsened the situation for livestock rearing in the coastal areas of Badin. However, small livestock keeping has picked up after the successive floods and destruction of rangelands. Goats, which are small and easily manageable during disasters, are found in almost every HH.

Fish Catch

In the coastal areas of Badin, fisheries not only provide food security, but also an important means of livelihood to local communities. According to a LHDP report, close to 500,000 people find employment in this sector. A majority of these people are involved in inland fisheries in creeks and lakes. Fishing communities are concentrated in coastal villages under the union councils of Bhugra Memon, Ahmed Rajo, and Kadhan. More than 15,000 people in these UCs purely depend on fishing as a main source of livelihood. Improper drainage schemes, especially LBOD and RBOD, have exacerbated environmental degradation in the fishing catchments areas of Badin and neighboring Thatta.

Wetlands drying up in Badin district prove climate change has been affecting the fishing community's livelihoods. LHDP reports almost 140,000 people involved in fishing previously, who now don't have fishing assets, have changed their profession to daily wage labour in nearby towns or have migrated to the cities of Karachi and Hyderabad.

Prawns and crabs have nearly disappeared since the 1999 cyclone. According to the FGD in Haji Hajjam village, the aquatic life was so abundant that children would catch crabs for fun and sell them to middlemen for up to PKR25. Successive floods since 2003 caused varieties of prawns, such as jero, kidi and patas to leave shallow waters.

Locals say that almost all the traditional breeds of Gundan, Jarko, Dahi, and Girmino fish are now a rarity in their coastal belt as a consequence of water shortages caused by climate change; while two breeds of Popri and Dhogno fish have gone virtually extinct from Badin coastal areas.

Forest and Vegetation

Badin has two government controlled/irrigated plantations at Buharki and Rari. The Buharki covers an area of just over 7000 ha and Rari almost 5000 ha.¹¹ However, the plantations are poorly stocked; around 500 ha of the total area are treeless. Large areas in the two coastal UCs of Ahmed Rajo and Bhugra Memon lie completely barren of any vegetation at all due to salinity and water logging. The main reason for this is sea intrusion, scarcity of fresh water, rising temperature, and frequent floods and cyclones that inundate and wash away whatever vegetation may start to grow.

The number of mesquite trees, locally called Devi, has reduced due to climate change. People's livelihoods are affected by this, because people would cut these trees down to sell, use as wood, or burn for fuel. Study participants from every village deeply regretted the trees fast disappearance.

The mangrove cover in the Indus delta was declared as 'protected forest'. However, reduction in fresh water flow, silt deposit, and the rise in sea level have destroyed most mangrove forests in the Badin and Thatta coastline. The lack of mangrove forests in the deltaic areas of Badin have not only increased vulnerability to sea intrusion, but has also negatively impacted the areas marine life e.g., planktons, fish, prawns and crabs.

¹¹ Baseline Survey of Coastal Areas of Badin and Thatta, Sindh Coastal Development Authority, Gov't of Sindh 2012

Left Bank Outfall Drainage (LBOD)

The LBOD has had a catastrophic effect on the people of Badin's livelihoods and its ecosystem. The LBOD project was aimed at draining effluent water into the sea using a single 42-kilometer tidal link. The drainage system wasn't supposed to affect the people and agriculture land in Badin, but later events proved otherwise.

The Choleri Weir, a large drain that was used to regulate excess water from entering the tidal link (the part of the drain that meets the sea), was destroyed by a cyclone in 1999 and hasn't been repaired due to technical difficulties. The tidal link is an open channel, and since the destruction of the Choleri Weir excess seawater overflows into Badin and other districts.

Before its construction, the natural flow of the lower Indus plain's surface water was from north to south leading to the Rann of Kuchh. However, the tidal link connecting the spinal drain was aligned in a south to west direction leading to the Samando Creek and the Arabian Sea disrupting its natural flow.

The northern embankment of the tidal link was frequently hit by waves from strong winds. In the absence of any protective measures, the embankment gave way to the waves erosive action and the water inundated the area previously protected by the embankment.

Indigenous Key Coping Mechanisms

The communities in Badin have faced extreme weather events for decades. Their proneness to these risks comes from the fact that in the last 10 years Badin was hit by five natural disasters. Naturally, the communities, especially those in three UCs of Ahmed Rajo, Bhugra Memon, and Khadan, have developed local coping mechanisms to respond to and prepare for future shocks. The development of coping mechanisms has been reinforced by relief and recovery programs undertaken by local, national, international NGOs, and UN agencies due to the high frequency of disasters that affect the area. Some of the most prominent coping mechanisms have been described below.

Preparedness and Mitigation Mechanisms

As flooding more frequently inundates the area people have realized that their houses need to be built on relatively higher lands with raised platforms of 3–4

feet high. According to them this will save their homes from flooding unless the water level rises above 4 feet. In addition, some of the villages have created an embankment of 4–5 feet outside the village to stop floodwater from entering the village. The flexible wooden frames used to build the houses also make them resistant to earthquake tremors.



Source: ADPC

Houses are built on higher ground to protect against flooding in Badin District, Pakistan.

To stop water from leaking into their home, people keep their roof tilted up to an angle of 15 degrees. To further reinforce the roof against seepage, a plastic sheet is spread across the roof before soil and mud plaster is placed. Other materials are mixed into the mud for greater roof stability including cow dung, cotton, wheat chaff, goat hair, tree leaves, grinded jute sacks, sand and sawdust. These objects are used differently in each village according to their quantity, availability and environmental condition of the area.

Along with these measures people perform seasonal maintenance on their mud walls by plastering fresh mud over them, especially before the monsoon season when maintenance is most difficult. The best time to do this is in April and May, when the mud dries the quickest.

To cope with land vulnerability around their houses people adopt a variety of measures, such as planting Mesquite and *Kikar* trees, which have large extensions of roots that create firm land.

Keeping wood for fuel and extra wheat and rice at home for an emergency, especially in the rainy and winter season, is an important preparedness strategy

people have adopted. Extra wood can also be used to rebuild homes affected by disaster.

Response Mechanisms

Communities cope with disaster affects by shifting their livelihoods from agriculture and fishing to off-farm work. Unfortunately, vulnerable households in need of extra money often reduce their food consumption, sell their assets, particularly livestock, and search for off-farm employment. While doing this they often incur debt and migrate to other places. Relief programs implemented by NGOs, UN and the provincial authorities can help them avoid this by providing financial aid.

Households often incur costs while applying coping mechanisms. In 1999, livestock prices declined by 90% compared to 1998. Livestock prices increased in 2001, but they still didn't reach the 1998 price level. In Sindh, livestock prices have continued to decline and were lower in 2001 than in 2000.¹² There has only been a gradual increase in livestock prices since then. Thus, the disaster-affected households not only lost their livestock, but were also receiving less income from animal sales.

Costs intensify when there is a dependence on migrant wage labor. While households send young men outside the village to look for employment, the increased supply of labor results in a 30%–40% decline in wage rates. At the same time, food and grain prices naturally rise over time. In a situation where wage rates have dropped up to 40% and livestock prices are down 60% the disaster struck HH face a significant challenge affording wheat and other essential commodities. It is ascertained that the poor spend more than 80% of their income on food. As a result, one of the first financial adjustments made is reducing their food consumption.

The HH reported adverse changes in food consumption over the last several years. Many households reported dropping meat and milk from their diet. Bread, and in some cases, rice have remained the major dietary components, as they are often unable to afford other foods. In almost all of the villages visited, HH reported consuming just chilies, onions and bread. A 2013 nutrition survey¹³ of Badin reported that 22% of children were severely malnourished while stunting among children was as high as 56%. The maternal malnourishment was noted at 23%.

¹² Needs Assessment for Post-Flood Rehabilitation of Affected Population of Sindh, November 2003, UN Agencies Report

¹³ Nutrition survey of Badin and Tando M Khan, Action Against Hunger, 2013

Most of the women visited as part of this study in Badin reported a change. “*Now almost 90% of the pregnant women go through complications resulting from anemia. This was not the case some years back,*” they said.

The farming and fishing communities also incur debt when recovering from a crisis. This is particularly true for *Hari* (*sharecropper*) families, who have very limited capacity to deal with any reduction in expected production. The *Zamindar* (*land lord*) often provides consumption and production loans to the *Hari* households and expects that he will provide additional labor services. It is common in Badin communities, like rest of the districts in Sindh, that a large number of the *Hari* households are indebted to the *Zamindar* for agricultural loans. The nature of these transactions locks the *hari* and *Zamindar* in a long contractual relationship. While notionally, the *Hari* families worked on a half share tenancy basis. They rarely got half-shares from the production due to the deduction of input costs and debts. In some cases, the landlord was able to recover the entire harvest as repayment for the *Hari's* share of the input costs, or as repayment of earlier loans.

Both seasonal and permanent migration has been observed in the coastal areas of Badin due to frequent destruction of livelihoods. Most coastal area village residents reported migrating seasonally for harvesting rice and sugarcane. They leave only 2–3 people at home, usually the elders, to take care of the house. Some households reported going to Karachi during the rainy season. They spend about two months there and then return back to the village.

There have been instances of permanent migration, especially in some villages in Bhugra Memon and Ahmed Rajo, where many ponds and creeks have become saline and the fish have disappeared. Hundreds of acres of land are rendered barren because of sea intrusion and water logging. People migrated to big cities like Badin, Thatta, and Karachi because of this. Some of them were working as *Haris* or sharecroppers, others as daily wage laborers.

On-going Programmes and Efforts to Address CCA Concerns

The discourse on climate change in Pakistan, particularly in Sindh province, is relatively new. The agriculture sector that provides around 47% of the employment and a means to food security in Pakistan is extremely vulnerable to the effects of temperature changes, extreme weather events, scarcity of water, and sea intrusion. Traditionally, the climate change concerns have been dealt with under the Ministry

of Environment, but just a few years back a separate Climate Change Division was established at the federal level. A similar division has yet to be created at the provincial level in Sindh. However, there are a number of initiatives and endeavors that have been taken at the federal, provincial, and district levels; some of the most significant ones are discussed here.

National Climate Change Policy (NCCP) 2012

Foreseeing the ensuing catastrophes of climate change and Pakistan's vulnerabilities, the government in 2008 set up a high-powered task force to take stock of the looming challenges and recommend a future course of action. The task force laid foundation for subsequent policy intervention by the government in the form of a National Climate Change Policy (NCCP).

Incidentally, in the preceding five years the NCCP Pakistan had to brave climate change disasters with unthinkable ferocity and unimaginable frequency. The



super floods of 2010 alone displaced twenty million people from their homes. The shocking floods of 2011, which particularly washed away Sindh, only underscored how difficult mitigating climate change is and the utter haplessness of Pakistan's people. The back-to-back floods of 2010 and 2011 prompted the government of Pakistan to mobilize all resources to secure Pakistan from the impending climate change catastrophes.

The NCCP document boasts that 2012 will always be remembered as a landmark in the climate change response history of Pakistan. Not only did the government approve NCCP, but also set up a full-fledged national Ministry of Climate Change.¹⁴

The NCCP discusses a variety of important policy components such as: appropriate measures relating to disaster preparedness, capacity building, institutional strengthening, technology transfer, introduction of the climate change issue in higher education curricula. Additionally, environmental compliance is assured through Initial Environmental Examinations (IEE), Environmental Impact Assessments (EIA) in the development process, addressing the issue of deforestation and illegal trade in timber, promoting Clean Development Mechanisms (CDM), and raising Pakistan's stance regarding climate change at various international forums.

The policy provides a comprehensive framework for the development of action plans for adopting national efforts on adaptation and mitigation. It is understood that this policy document is a 'living' document, and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change. However, a great deal of initiatives will have to come from the provinces. Following the 18th amendment to the Constitution of Pakistan, under a process of devolution, the provinces are now expected to manage many of the issues previously managed by the federal government. To facilitate the provincial governments in incorporating and addressing CCA, the Climate Change Division/GoP has developed an action plan, known as the Framework for Implementation of Climate Change Policy for the NCCP.

¹⁴ National Climate Change Policy 2012, Government of Pakistan

Action Plan for NCCP 2014-2030

Formally known as the Framework for Implementation of Climate Change Policy, the action plan was approved by the government towards the end of 2013. It is a follow up to the NCCP, which serves as a principal national document on climate change impact. It was developed with an understanding of the current and anticipated climate change hazards. Its development had active participation from relevant government departments at the federal and provincial level, UN agencies and NGOs.

The Action Plan spells out the vulnerabilities of various sectors to climate change and the appropriate adaptation actions, along with identifying responsible agencies. Strategic actions have been categorized as Priority Actions (PA) that should be completed within two years; Short term Action (SA) completed within five years; Medium term Actions (MA) completed within 10 years; and Long term Actions (LA) within 20 years. For instance, it covers adaptation actions to address climate change concerns for water, agriculture, forestry, biodiversity, health, in coastal areas and other vulnerable ecosystems. This plan talks about appropriate actions pertaining to disaster preparedness, capacity building, institutional strengthening, and raising awareness in relevant sectors.

The section on coastal areas has an overarching objective to develop adaptation to climate change impacts on coastal and marine ecosystems. It employs six strategies that includes building natural plantation barriers along the coastal areas, constructing structural barriers to safeguard low-lying areas, developing salinity tolerant crops, maintaining optimal river water flows to the deltaic ecosystem, reducing and controlling solid and liquid waste in bay areas, and maintaining marine ecosystem and fish habitats for a healthy fisheries sector. The constitutional amendment mentioned before states the agencies responsible are the ones belonging to provincial governments in addition to NGOs such as WWF and IUCN.

Provincial Level Endeavours

The Environmental & Alternate Energy Department located in Sindh was established in October 2002, through a cabinet order to supervise its subordinate directorates: the Sindh Environmental Protection Agency and Alternative Energy Wing. At the macro level, the department is assigned the responsibility for the protection, conservation, rehabilitation and improvement of the province's

environment with the support of regulatory documents. Also, it promotes alternative energy sources to address energy shortages. Lately, the department has been assigned climate change related responsibilities, though without a clear vision or plan.

At the provincial level, for lack of clarity and consequent apathy, there is no climate change policy for the province at the national NCCP level. The action plan that has been developed with consultations from provinces, including Sindh, requires a number of provincial initiatives, but none have been made.

a. Sindh Coastal Development Authority

Established in 1994, its aim was to develop and improve the coastal areas of Thatta and Badin Districts. The SCDA is responsible for the overall development, improvement and beautification of the target coastal areas. It also identifies, sponsors, coordinates, and executes development schemes/activities.

Until 2001, only three projects consisting of planting oil palm, Coconut, and Salicornia in the coastal zone were implemented by the SCDA. The federal budget funded two of these three projects. In 2001, the SCDA was restructured and its role was confined only to identifying, sponsoring, coordinating, monitoring and evaluating the CDA schemes in the Thatta and Badin coastal areas. However, the authority has yet to perform to its full potential to develop the coastal areas of Sindh. While there have been a number of development schemes and a couple of large projects, such as an ADB funded initiative to support economic development and wellbeing of the coastal communities, the authority doesn't seem to have a multiyear strategic plan to steer the development planning. The SCDA is responsible for the coastal belt of Thatta and Badin districts while different departments deal with the western coast.

b. Sindh Coastal Community Development Project (SCCDP)

The SCCDP was an Asian Development Bank funded project with matching funds provided by the government of Sindh, and was implemented through SCDA during 2008–2013. It has been the most significant project in the coastal areas of Sindh where a number of aspects have been addressed with an overall cost of USD40 Million.¹⁵

The project aimed to achieve ecologically sustainable income and give poor residents accessibility to public services in the eight coastal Talukas (sub-districts)

¹⁵ <http://www.adb.org/projects/37188-013/details> retrieved May 17, 2014

of Thatta and Badin districts. The specific outputs included: (i) sustainable community-managed income generating mangrove stands, pond/raft fisheries, and shell fisheries established; (ii) transparent and accountable community-driven mechanisms for identification, implementation and operations and maintenance of civil works and public services in place; (iii) increased and sustainable financial and non-financial services for household income generation provided, inclusion of community organizations, training and access to microfinance; (iv) environmentally sound coastal medium term development, management, and conservation plan implemented by CDA; and (V) an operational project management system.

The project had four programmatic components: (i) improved coastal management, which includes (a) mangrove planting, (b) crab/prawn pond and bivalve raft development, and (c) hatchery rehabilitation; (ii) community development including (a) community organization, (b) demand-driven small-scale community-managed initiatives, and (c) demand-driven local government-managed medium scale initiatives; and (iii) institutional capacity development.

The project was completed¹⁶ on 31 December 2013 and reports a number of achievements. Some of the most significant included: a) Annual household income increased by 12.8% against a 7% target. b) Household access to safe drinking water supply increased by 35%, and improved roads increased by 40%. The roads were built on high platforms to provide safety against floods. c) Baseline surveys, village profiling, and development planning for improving natural resources and village infrastructure was implemented for all 847 target villages.

These efforts show that the project was essentially based on poverty reduction in the coastal areas. DRR and climate change related concerns have not been directly dealt with. However, some of the program components, such as replanting mangroves, collaterally aided CCA.

c. Indus for All/ WWF

The Indus for All Programme was the first 5-year (April 2007–March 2012) implementation phase of the Indus Ecoregion Conservation Programme's 50 years vision that stems out of the ecoregion conservation initiative undertaken internationally by the World Wildlife Foundation as part of the Global 200 Ecoregions. Funded by the Royal Netherlands Embassy in Pakistan, the Program is implemented by WWF Pakistan in close collaboration with the Government of Sindh, selected NGOs and local communities.

¹⁶ Project Data Sheet, SCCDP, ADB Pakistan



The program aims to conserve¹⁷ the Indus eco-region's rich biological diversity through livelihood improvement of the local communities. The program intends to achieve, a) community-based Natural Resource Management in four priority areas (Keti Bunder, Kinjhar Lake, Pai forest and Chotiari Reservoir); b) improved natural resources and livelihoods through the mainstreaming of poverty-environment linkages at policy, planning and decision-making levels; c) improved institutional capacity and awareness for sustainable environmental management at various levels; and d) Improved alignment and collaboration for stakeholder interventions.

So far there hasn't been any initiatives in the Badin coastal areas. Currently, DRR and CCA concerns have not found a niche in the overall Indus Eco-region Program.

d. Badin District DRM Plan

Under the National Disaster Management Act 2010 all the relevant levels of governments, from top level to districts, have been advised to formulate and develop their respective Disaster Risk Management (DRM) plans. Badin is well

¹⁷ http://foreverindus.org/ifap_about.php retrieved May 17, 2014

ahead in this regard. The district had developed a DRM plan in 2008 with the active consultation and input from line departments, NGOs and the provincial DMA.

This plan is formulated in compliance with the format prescribed by NDMA. Apart from discussing the socio-economic, administrative, and geographic aspects of the district, it has mapped a variety of natural and human induced disaster risks facing Badin district.¹⁸ The plan has detailed discussions on institutional arrangements, risk assessment, training, education and awareness, community based disaster risk management, and multi-hazard early warning systems. The plan duly discusses the structures and coordination mechanisms for DRR and DRM and the responsibility entities inside and outside of government.

This is a useful document to begin with. However, as climate change concerns were not a priority at the time of its formulation in 2008, it needs to articulate hazards and disasters in the context of climate change. Moreover, NDMA policy prescribes that DRM plans must be reviewed and refreshed periodically to keep the planning relevant and intelligent. It's time this plan was refreshed to include climate change concerns.

e. CCA Strategic Plan Badin

The Climate Change Adaptation Strategic Plan is a document prepared by the Laar Humanitarian and Development Program (LHDP) the partner NGO of Oxfam Novib. Developed in 2013, with the help of local line departments and NGOs, it shows the historical trends in Badin's precipitation, temperature, rise in sea level, and sea intrusion.

The plan discusses the climate change related vulnerabilities and risks to local water resources, agriculture, livestock, fisheries, coastal ecosystems and biodiversity. It offers a number of measures to address these vulnerabilities to the livelihood and ecosystem of Badin.

The LHDP has done a commendable job drafting a CCA strategic plan for Badin, especially in the context that Sindh province has yet to develop its own CCA policy. However, LHDP will have to undertake an aggressive advocacy campaign to get the district government fully committed to CCA for DRR and sustainable development.

f. Community Based Climate Change Adaptation Project

LHDP has implemented a yearlong project in Badin's Coastal UC's of Bhugra Memon, Kadhan, and Ahmed Rajo. Funded by Oxfam Novib, the project's physical

18 District Badin Disaster Risk Management Plan 2007-08

infrastructure has been implemented in close collaboration with the government's irrigation department. The project aims at addressing sea intrusion in Bhugra Memon. It included training and raising awareness on climate change and DRR issues to build community resilience. The project has built a 2.3-meter high and 2.2-kilometer long wall to stop sea intrusion from affecting agricultural land. The work has resulted in reclaiming hundreds of acres of cultivable land.



An embankment built by Laar Humanitarian and Development Program to prevent against flooding in Badin District, Pakistan.

Source: ADPC



Conclusion and Recommendations

Conclusions

Based on information collected through literature review, KIIs with climate change and DRR experts in Islamabad, Karachi and Badin, and conversations with six vulnerable community groups in Badin's coastal areas; one can reach a number of conclusions vis-à-vis risks and vulnerabilities that the coastal communities of Badin face from climate change induced disasters.

Seen from the human development perspective, the district of Badin falls among the 'average' index of 0.63, but this is not an accurate representation of the situation. Significant amounts of Badin's youth are malnourished and not attending school. The infant mortality rate (IMR) remains as high as 87 per 1,000 births, and maternal mortality rate (MMR) at 410 deaths per 100,000 births. Only 64% of the children between 12–23 months received full immunization. Children and women are generally found anaemic from malnutrition resulting from food insecurity. The situation with pregnant and lactating women is even worse; in every village visited people complained that they had been reduced to eating bread with onion or chilly paste. Outside intervention is required to improve the lives of these suffering people.

Badin is among the poorest districts of the province, where the poverty has increased from 1987–2006, and those below the poverty line have increased from 55% to almost 70%. The people of Badin rely on agriculture and fishing for their livelihoods. Past disasters indicate fishing and agriculture sectors are vulnerable to climate change effects, and livelihood opportunities have suffered as a result. Badin's land once supported rice paddy farming in swampy deltaic land saturated with natural salts. Today, sugarcane is the major cash crop because of water shortages.

Climate change has greatly impacted the livelihood options of Badin's people. The erratic rainfall, reduction of fresh water flows towards the deltaic region, and the habitat destruction of mangrove and other coastal flora and fauna have adversely impacted agriculture and fisheries in the area. This is further aggravated by sea intrusion causing water logging to encroach on hundreds of hectares of agricultural lands. Thousands of people had to migrate to other areas because of this.

The coastal communities have acquired a basic understanding of climate change concerns and its effects on their lives and livelihood. Villages also have a basic understanding of DRR and measures to respond to disasters. As mentioned earlier, the practices of building houses on raised platforms, storing key grains to prepare for food shortages, and getting their animals vaccinated before Monsoons are current strategies in the villages visited.

Despite encouraging DRR advancements in the form of NCCP and its action plan, climate change doesn't seem to be prioritized in provincial policy making. No forum has been created at the provincial level for NGOs to address the issues of climate change, DRR and sustainable development.

There are numerous CCA vulnerabilities, because of an overall deficit in climate change and DRR knowledge, preparedness, and responses mechanisms. In order to improve upon this situation, a number of recommendations may be considered to pave the way for actions at various levels.

Recommendations

Community Level

- a. At the village and community level there is a basic understanding of community based DRR (CBDRR), yet the mind-set is generally keener towards receiving relief assistance than mitigating work on resilience building and responding to disasters. It may be useful if the vulnerable villages are periodically trained in the basics of CBDRR and effects of climate change along with the need for necessary adaptation.
- b. People in vulnerable villages should be taught to develop and prepare their village with specific DRM plans. This way the villagers are not only able to take preparedness measures, but are also able to survive the first 48 hours, before rescue and relief workers get there.
- c. In order to keep the vulnerable communities keen on what they have learned regarding DRR/M, it is important that periodic emergency response exercises and mock drills are organized.

- d. To create a focal point entity within each village, a DRM group of youth may be prepared to lead the community vis-à-vis disaster preparedness and response activities.
- e. The communities will have to be educated on appropriate climate change adaptation measures needed for coastal areas of Badin in the sectors of agriculture, fisheries, and forestry. This may include changes in natural resource management practices such as efficient water use techniques, and promoting crops that need less water, etc.
- f. The communities have to be encouraged to promote vegetation and afforestation. It will be useful to have a mass tree plantation drive once every year around spring season.

District Level

- a. Badin District's DRM Plan was developed in 2008. While it should have been reviewed and revised at least twice by 2014, the document is hardly consulted by DDMA. It's imperative that this DRM Plan is refreshed and revised incorporating lessons learned from the 2010 and 2011 floods, and more importantly articulating the CCA concerns that are completely missing in the existing document.
- b. There's a related issue of the continuation of DDMA in Badin. The DDMA's were initially provided with technical specialists in DRM by different UN agencies, but mainly UNDP under the ONE UN DRM Program. The understanding was that after the first 3–4 years the government would take over and pay the specialists from its regular budget. However, after the UN program funding stopped, DDMA in Badin and other provinces are without DRM specialists. It's important that all advocacy and campaigning aims to persuade government officials to bring back the DRM specialists. Badin requires these specialists specifically, because it is among the most disaster prone districts in the province.
- c. An extended short-term option could be that in addition to advocacy and campaigning, ADPC/Oxfam Novib may provide a Technical Assistance (TA) to the district government. The TA could be a makeshift arrangement for the DRM specialist in Badin. The district cannot afford the risk of not having a dedicated DRM specialist to advise the district government.
- d. ADPC/Oxfam Novib will contribute greatly to the resilience of this district if they can organize periodic training for officials of district line departments in DRR, DRM, and climate change concerns. The line departments often transfer

government officials to different areas, so the training will have to be scheduled accordingly.

Provincial Level

- a. Provinces will always lag behind if climate change is not dealt with as a special area of attention. climate change concerns can't be left to a department that will focus on other matters. A special department that focuses on DRR must deal with climate change and the risk that comes with it. The department can then work with the government to establish climate change policy and plans.
- b. ADPC & Oxfam Novib in collaboration with other actors may undertake policy advocacy and awareness rising campaigns with the provincial government to give climate change concerns due importance.
- c. The SCDA will have to emerge as the champion of development for coastal areas of Sindh. The current reactive approach may not fetch any radical changes to its programmatic outlook. It's going to serve the coastal communities in the long run, if SCDA develops its vision of coastal areas and ecosystem development in the form of a strategic plan to guide its future direction and programming.
- d. The SCDA and Environment department can also come up with new programs for coastal areas where climate change concerns are kept as main activities. Such programs can be designed with input from the Climate Change Division at the federal level to attract international funds through Green Climate Fund and Global Environment Facility as provided under United Nations Framework Convention on Climate Change (UNFCCC) provisions. ADPC & Oxfam Novib could be partners in such an initiative.
- e. The flow of water downstream from the Kotri Barrage, which the deltaic area's agriculture and coastal ecology depends on, has reduced over the years. A study carried out by International Panel of Experts (IPoE) in 2005, advised 5,000 cusecs of water should be released downstream from the Kotri daily throughout the year. While Sindh has demanded 10 MAF release of water post-Kotri barrage annually under the 1991 Water Accord. Overall, the flow has been erratic to say the least, 25.3MAF was released in 2005; 21.7MAF in 2006; 15.7 MAF in 2007; 5.8MAF in 2008; 4.06MAF in 2009; 14.2MAF in 2011 and 6.2MAF in 2012¹⁹. Seeing the importance of this issue, the local civil society and NGOs will have to undertake constant advocacy and campaigning.

19 According to a media statement in Jul 2013 by Chief Engineer of the Kotri barrage

Annex 1: List of Villages Visited and Key Informants

TABLE 2: FIELD GROUP DISCUSSIONS

SNo	Village	UC	Taluka
1	Usman Nohiro	Ahmed Rajo	Shaheed Fazil Raho
2	Ismail Themor	Ahmed Rajo	Shaheed Fazil Raho
3	Vikeo Lanjar	Kadhan	Badin
4	Tahir Bajeer	Kadhan	Badin
5	Ramzan Dal	Bhugra Memon	Badin
6	Haji Hajjam	Bhugra Memon	Badin

Source: ADPC

TABLE 3: KEY INFORMANTS

SNo	Name	Designation/Org	Location
1	Mr. Ahmed Kamal	Senior Member, DRR, National Disaster Management Authority	Islamabad
2	Mr. Munir Sheikh	Director General, Global Change Impact Study Centre	Islamabad
3	Mr. Ifran Tariq	Director General, Climate Change Division, Gov't of Pakistan	Islamabad
4	Mr. Shamsulhaq Memon	Advisor, Sindh Coastal Development Authority, Gov't of Sindh	Karachi
5	Mr. Akhlaq Queshi	Director Operations, Provincial Disaster Management Authority	Karachi
6	Mr. Fida Somroo	Ex-DRM Coordinator DDMA Badin	Badin

Source: ADPC



Asian Disaster Preparedness Center

SM Tower, 24th Floor 979/69 Paholyothin Road
Samsen Nai, Phayathai, Bangkok 10400 Thailand

Tel: +66 2 298 0682-92

Fax: +66 2 298 0012

E-mail: adpc@adpc.net

Web: www.adpc.net