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# MIGRATION, WATER STRESS AND CLIMATIC CHANGE IN THE INDUS DELTA

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A SCOPING STUDY

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## ABBREVIATIONS

ADB	Asian Development Bank	OGB	Oxfam Great Britain
AKPBS	Aga Khan Planning & Building Services	PDI	Participatory Development Initiatives
BDRO	Badin Development & Research Organisation	PF	Pakistan Fisher Folk Forum
BoE	Bureau of Emigration	PIDE	Pakistan Institute of Development Economics
DDMA	District Disaster Management Authority	PSLM	Pakistan Social and Living Standards Measurement Survey
DHQ	District Headquarters Hospital	PRSP	Poverty Reduction Strategy Paper
EDO	Executive District Officer	RHC	Rural Health Centre
GCISC	Global Climate Impact Study Centre	SAFWCO	Sindh Agricultural and Forestry Workers' Organisation
GoP	Government of Pakistan	SPSS	Statistical Programme for Social Sciences
GoS	Government of Sindh	THQ	Tehsil Headquarters Hospital
IPCC	Intergovernmental Panel on Climate Change	UC	Union Council
IUCN	International Union for Conservation of Nature	UNDP	United Nations Development Programme
LBOD	Left Bank Outfall Drain	WB	The World Bank
LEAD	Leadership for Environment and Development	WWF	World Wildlife Fund
LHDP	Laar Human Development Programme	USAID	United States Agency for International Development
NIPS	National Institute of Population Studies		

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## EXECUTIVE SUMMARY

The present report is an outcome of primary and secondary data collection and analysis carried out over a period of three months starting the last week of February 2010. Data was collected through literature review; a household survey in districts Thatta and Badin; and interviews with key informants, a small number of migrant families and local community members in the two districts. The report builds on two previous studies published by Oxfam-GB in 2009: *Climate Change, Poverty and Environmental Crisis in the Disaster Prone Areas of Pakistan* and *Climate Change in Pakistan- Stakeholder Mapping and Power Analysis*.

Our findings reveal that the current scale of migration from the Indus Delta is not large in absolute numbers. However, it underscores several social, economic and environmental realities which merit attention of policy makers and other actors. The coastal belt, especially in Thatta, has seen families moving to Karachi in successive waves following shortage of drinking water, seawater intrusion and extreme events since 1970s. Estimates suggest that at least 4000 families or around 40,000 people from the two districts are now residing in coastal Karachi, concentrated in the villages of Ibrahim Hyderi and Rehri. Their presence in Karachi provides an incentive to others in the Delta region to move in drawing on ethnic and social links to minimize the risks involved in the process of migration. The squatter settlements of Naseem Nagar, Sheedi Goth and Bund in Qasimabad, Hyderabad host at least 150 families from district Badin, many of whom moved in after being displaced by storms and cyclones.

We can safely say that labour migration-where an individual or two from a family settle elsewhere for work-is a relatively new phenomenon in the context of Thatta and Badin starting in 1990 or thereabouts. Excluding the migrants who are settled within the two districts, a total of 2.5% households reported a family member working elsewhere in Sindh and Pakistan. Individuals from the coastal belt have gone mostly to Karachi and those living in upper *talukas* to Hyderabad and Mirpurkhas. In line with broader studies on migration, the survey reveals a greater propensity to migrate within the lowest and the highest income quintiles.

By contrast to the reasons mentioned for migration of a family member-which related mostly to poverty, failing crops and employment issues-respondents planning to migrate themselves mention lack of drinking water as a primary reason. Since water scarcity involves entire families moving, we may be looking at potentially large numbers of people on the move in years to come.

In what appears to be indicative of the link between climate change, environmental degradation and migration, percentage of those who reported to have lost some agricultural land to salinity or seawater intrusion is higher within the respondents who say they are thinking of migrating compared to those who are not.

With regard to migration as well as socio-economic characteristics of population, the Scoping Study establishes the importance of caste, class, ethnicity and land ownership as significant determinants of mobility. These variables have a bearing on successful adaptation to climatic changes and access to information and public services as well. Survey findings reveal the presence of non-Sindhi

populations in both Thatta and Badin in noticeable numbers. Social policy and planning for the Indus Delta need to be informed by an understanding of the multi-ethnic composition of the two districts.

Sector specific findings point to high levels of debt in the fishing community. Majority of households engaged in fishing report that they are bound to sell their catch to a middle man. However, they do not necessarily see the role of middle men as negative since the middle men provide credit and fishing resources in the absence of institutional support. Most fisher folk cite “dearth of fresh water flows into the Indus” as the primary cause for dwindling fish catch.

In the agricultural communities, an overwhelming majority of farmers report that they have seen a decline in crop yields, with lack of irrigation water cited as the main reason. There is evidence of farmers making efforts to adapt to the changing environment and climate by switching to relatively less water intensive crops. It would be safe to assume that the cultivation of cotton has increased, while that of sugarcane and rice has gone down substantially in both districts.

Survey findings indicate that large land holders have been more successful in adapting to changing climatic conditions and water scarcity compared to small and marginal land-holders. The process of adaptation needs to be steered through appropriate policy responses taking the needs of poorer farmers into account. That would entail value chain and business development services around less water intensive and marketable crops, such as potato and oil seeds.

The reported level of interaction between government officials and farmers as well as fisher folk with regard to climate change adaptation is extremely low. Women, marginal land holders and those belonging to minorities have very low percentages of respondents saying they have been contacted by a government official to discuss adaptation issues. The situation is no better with regard to NGOs, except to some extent in Lower Thatta, where most NGOs appear to be concentrated. Ironically, Lower Thatta still comes out worst in terms of education profile, access to health services and safe drinking water. In what makes for a disconcerting contrast to the disaster prone history of the region, the level of awareness on disaster preparedness is extremely low. Despite official claims to the contrary, vast majority of people in the two districts have had no participation in disaster management planning.

Evidence of steady reduction in fresh water flows downstream Kotri Barrage is hard to refute. In the absence of a lack of agreement on the exact amount of environmental flows required to maintain the deltaic ecosystem and local livelihoods, a fresh and dispassionate look at the issue is required involving deltaic people in future negotiations. That holds true for planning of new reservoirs as well. The government needs to publicize the findings of a study it commissioned a few years back, which calls for significantly lower amounts of minimum environmental flows compared to the figure agreed upon in the 1990 Water Appointment Accord.

At a conceptual level, the Scoping study contends that economic valuations of environmental degradation and market-based solutions, such as water pricing, can at best provide partial and short-term solutions since they do not take social and environmental externalities into account. We need to expand our ethical, conceptual and temporal frames to effectively address the issues of

water stress and climate change in years to come. As a practical measure, we call for using the concept of Water Footprint calculation to ensure ecologically sound and sustainable decisions in water and agricultural sectors as we approach a water scarcity scenario.

The plea for broadening ethical horizons also applies to the issue of ecological or climate debt. Just as representatives of developing nations demand that the industrialized countries finance climate change adaptation and mitigation for their historical contribution to anthropogenic climate change, people in the Indus Delta are well within their rights to call upon the Government of Pakistan to make amends for the consequences of unsustainable development practices on the ecosystems and natural resources they depend on.

The study calls for greater equity in the distribution of irrigation water between small and large land-holders and a check on the manipulation of the system by large land owners with political influence. In the context of renewed calls for investments in large dams, the Scoping Study contends that past experiences warrant an urgent attention to more equitable and fair distribution of water and a shift toward drip irrigation and less water-intensive crops before toying with new mega projects. Monitoring the quality of surface water aquifers and strengthening preventive and curative services for diarrheal diseases is also recommended.

With regard to the fishing community, the Scoping Study underscores the need for providing credit for boats and helping fisher folk diversify livelihoods through the development of non-farm agricultural sector. The role of middle men, who serve as informal sources of credit and insurance against lean periods, is not necessarily viewed in a negative light by the local people. While it would be desirable in the longer term to have these services provided through private banks or state institutions, demonizing or penalizing the middle men does not offer a viable solution. It would make more sense to engage them and oversee their role with a view to minimizing exploitative practices.

The process of data collection as part of the present study brought into sharp relief the inadequacy of official statistics when it comes to studying migration and issues related to the fishing community. For example, the National Census needs to account for migration out of a district and not just in-migration as it currently does. Even within the latter category, population movement from one sub-administrative unit to another within a district is not covered. Similarly, the Economic Survey and the District Census Reports lump fisher folk under the occupational category of agriculture, making it extremely difficult to get proper estimates on their numbers and geographical spread. For effective migration management in the context of increasing water stress and climate change, the country will require more robust data collection processes. The Scoping Study also recommends the development of a comprehensive Migration Policy to address internal and external migration in the context of climate change events and processes.

The study, we hope, provides a useful baseline on existing levels of migration; community perceptions of environment, water stress and climatic changes; and issues related to livelihoods. Variations between regions and across different social groups could help governmental and non-governmental actors prioritize their actions and allocate resources accordingly. It is hoped that the

study will provide a springboard for constructive discussion, further research, evidence-based advocacy and informed social action.

# 1. OVERVIEW AND CONTEXT

The present chapter draws on a critical review of literature and interviews to put the primary data into perspective. We begin with an attempt to understand migration from a multidisciplinary perspective and in the context of environmental degradation and climatic change. This is followed by a discussion of some key issues facing the Indus Delta and their evolution over time. Finally, we identify challenges and opportunities available to us as we face increasing levels of water stress and climatic changes.

## 1.1 Understanding Migration

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The story of migration in what now constitutes Pakistan is inextricably linked with changes in environment, natural and human induced. As far back as 1880s, the region saw population shifts with the British Administration developing and expanding canal irrigation. The canal expansion had the most dramatic demographic effect in the Punjab starting 1880s. The province saw huge population shifts as people were encouraged to settle into newly irrigated lands. Much later, the construction of Sukkur Barrage in the 1930s resulted in Sindh receiving fairly large numbers of migrants, many of whom came from the so-called cultivating castes of the Punjab.

In historical terms, migration in the Indian subcontinent is marked by certain regional, ecological and ethnic variables. Agrarian regions in eastern Afghanistan, the northern and western colonial Punjab, and the North West Frontier Province “produced surplus workers looking outside the immediate village economy for subsistence and opportunity”<sup>1</sup>. Productive processes in parts of the subcontinent, particularly the North Western Pashtun region and arid districts of the Punjab, involved a regular pattern of circulation of manpower for military service, trade and labour (Nicholas 2008: 3-4).

In the post colonial period, migration of large numbers of young men from Azad Kashmir to the UK in 1960s came hard on the heels of the construction of Mangla Dam, which displaced many. High demand for workers coupled with lenient immigration controls for the former subjects of the British Empire allowed these men to settle in the UK with their families. During 1950s and 1960, the level of rural to urban migration in Pakistan was among the highest anywhere in the world. Many of those leaving the rural areas had been affected by farm mechanization that went in the name of Green Revolution. Fragmentation of land into smaller units down the generations also contributed to rural-urban migration (Zaidi 1999: 401).

The oil and construction boom in the Middle East in 1970s opened up new opportunities for Pakistani labourers. Apart from provincial capitals, Rawalpindi and the Makran region of Balochistan, most Emigrants to the Gulf came from rain-fed, low agricultural income areas of the Punjab and NWFP re-enacting a centuries-old pattern. The areas of highest international migration

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<sup>1</sup> The North West Frontier Province or NWFP got a new name-Khyber Pakhtunkhwa-through a constitutional amendment in 2010.

from Pakistan have also tended to supply the largest number of internal migrants i.e. the areas where agricultural incomes are low and erratic depending on the rainfall.

The share of Sindh province in both international and internal migration has been low<sup>2</sup>. Cultural factors pointing to relative immobility in rural Sindhi society provide a partial explanation at best. The fact that share-cropping in agriculture, which ties families down to the land, has been most pre-dominant in Sindh also needs to be taken into account. Add to that community links in urban centres within Pakistan and abroad which helped Pashtuns and Punjabis to follow into the footsteps of earlier migrants. Unequal distribution of overseas employment opportunities with most licensed recruiters based in provincial capitals and large cities in the Punjab, could well have been another contributing factor.

In 1990, the Intergovernmental Panel on Climate Change (IPCC) noted that the greatest single impact of climate change could be on human migration—with millions of people displaced by shoreline erosion, coastal flooding and agricultural disruption. Since then, various analysts have tried to put numbers on future flows of climate migrants, sometimes called “climate refugees”, the most widely repeated prediction being 200 million by 2050.

While the evidence for anthropogenic climate change is now well-established and the prospect of large-scale population movements as a result of slow-onset disasters and sudden extreme events is hard to brush aside, ascribing a particular cause to migration and categorizing migrants into simplistic categories—internally displaced versus voluntary migrants, climate refugees versus migrant labourers—can be extremely misleading. It can amount to reification of reality

### ***ILLEGAL IMMIGRANTS OR “ECO-MIGRANTS”? BANGLADESHIS IN PAKISTAN***

Official estimates put the number of irregular migrants, also called aliens and illegal migrants in Pakistan, at around 3.5 million. These include 2 million Afghans across the country, and about 1.1 million Bengalis or Bangladeshis mostly concentrated in Karachi. Often vilified by local media and resented for suppressing wages and using unsustainable practices in Karachi’s fishing industry, many of them were forced out of their country because of environmental stress. Based on focus group discussions in Karachi’s squatter settlement, Machar Colony, and analysis of meteorological data, Umrani (2008) provides strong evidence of climatic processes, repeated floods, cyclones and seawater intrusion in Bangladesh’s Chitangong, Farid Pur and Chand Pur Districts, having played a major part in pushing these immigrant families out of Bangladesh during mid-1970s to early 1980s.

Appreciating environmental drivers which may have forced Bangladeshis into Pakistan, could help us plan better in the context of climate change nationally and in the South Asian region.

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<sup>2</sup> Data maintained by the Bureau of Emigration (BoE) for the period 1981-2007, for example, shows district Rawalpindi in Northern Punjab to have produced over 200,000 registered emigrants. The figure for Mardan in Khyber Pakhtunkhwa province is over 90,000. By contrast, districts Thatta and Badin produced only around 2000 emigrants each.

through the use of arbitrary definitions<sup>3</sup>. It can also be used to create a hierarchy of victims, with some more worthy of official support than others.

In fact, as the case of people from Pakistan's arid areas migrating to the Gulf or to urban centres within the country shows, migration has for long been used as an adaptation strategy in this part of the world. However, to classify migrants as environmental or climate refugees would amount to over-simplifying a complex phenomenon. Looking at them simply as economic migrants in search of greener pastures and sidestepping environmental and development induced movements of population would be equally simplistic<sup>4</sup>. Migrants, it has been noted, have a degree of enterprise and resourcefulness required to undertake journeys and settle into alien lands. Typecasting them all into hapless individuals and uprooted families may not be a true depiction of reality.

Some writers have suggested "eco-migrants" as a concept reflecting both economic and ecological elements which are often difficult to disentangle. A small landholder who abandons his land due to salinization leaves because there is an increasing lack of livelihood opportunities. In this aspect, he pretty much resembles a typical "economic migrant". Gradual environmental degradation can cause more widespread and far-reaching migration than sudden disasters (UNDP 2009: 45). Coastal villages of Rehri and Ibrahim Hyderi in Karachi, which are now home to at least 4 thousand families from Thatta and Badin arriving here in successive waves starting in 1970s, reverberate with stories of water aquifers gradually going brackish and sea water intruding inland to destroy cultivable land. Those who migrated from Badin to Hyderabad's squatter settlement of Naseem Nagar on the other hand, mostly speak of the 1994 floods which uprooted them. In both cases, social ties with relatives already settled in destination cities allowed them to take temporary shelter and eventually a permanent residence in Hyderabad and Karachi.

There are then, many subtexts running through the migration story, which already include climatic variability, scarcity of water, development interventions and mega projects. Official policy measures to oversee migration and optimize its benefits have been conspicuously weak. Emigration to countries such as the U.A.E, Saudi Arabia, Oman and Muscat for example, took off largely on private initiative; initial emigrants served as mini-recruitment agents and helped bring their relatives, friends and neighbours over. At the same time, foreign and local recruiters began to enlist workers en mass (Addelton 1992: 52). There also emerged an industry specializing in irregular migration, which was an attractive prospect for many unable to afford the costs associated with

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<sup>3</sup> For a discussion of how categorization of migrants can reduce complex processes into simplistic explanations, see Linden and Selier (1991). UNDP (2009, 45-6) presents an interesting summary of how environment and livelihood factors may combine to shape migration.

<sup>4</sup> Most official reports dealing with migration offer as a preface to their findings some account of why people migrate. Following neo-classical microeconomic approach, a list of push and pull factors is presented with the migrating individual seen as a rational, utility-maximizing human being, who assesses the available destinations and chooses the optimum combination of employment opportunities, wage rates, cost of travel, returns on investment and so on. Theoretical accounts of migration emanating from the disciplinary fields of sociology and political economy that go beyond individual approaches to look at wider social, economic and political structures defining migration are usually absent in official accounts and policy documents. The classical individualist views, it would seem, offer more comfort to policy makers who look upon migration primarily as a relatively simple means for employment generation and foreign exchange earnings.

regular channels<sup>5</sup>. The emigration scene during 1970s and 1980s was characterized by two worlds-of official policy makers and what actually happened, with occasional overlaps. Government policies were more of a series of reactions rather than initiatives.

A similar laissez faire attitude was noted in connection with rural-urban migration in Pakistan as far back as 1980s (Selier 1988: 44). Rural migrants arriving in Karachi, for example, set themselves up in “illegal” squatter settlements, deprived of basic amenities and public services. The vacuum created by the absence of public planning and foresight got filled in by private mafias monopolizing access to services and land. The city got divided along ethnic lines, often erupting in violent clashes, which have begun to resurface of late.

Internal migration fell through the policy cracks again when in 2009 the government came up with a document called, the National Emigration Policy (GoP 2009 c). As the name suggests, the policy does not deal with issues related to migration taking place within the country. Even when dealing with emigration, policy responses have to be rooted in an understanding of migration not just as an isolated individual choice but a complex decision, taken in the context of local and global political economy, existing networks, past links with the destination countries, and so on<sup>6</sup>. The policy document, for example, is silent on distributing recruitment infrastructure for overseas employment equitably; removing the provision in the Emigration Ordinance 1979 which bars women less than 45 years to emigrate<sup>7</sup>; and overseeing the role of middlemen in emigration.

The debate on migration in the context of climate change needs to build on the already existing narrative on migration and its various sub-texts. What areas are likely to produce migrants and where will they end up? Are there slow-onslaught disasters already leading to migration? Will climate induced migration play out within the web of existing vulnerabilities. How will it affect men and women? What institutional and policy mechanisms exist to oversee migration as a climate change adaption strategy?

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<sup>5</sup> Many of those who went to the Gulf through irregular channels have cited high costs involved in travelling legally as the reasons they opted for illegal recruiters. Legally, Overseas Employment Promoters (OEPs) are allowed to charge Rs. 4500 as service charges, a provision which is honoured more in breach (Arif 2008).

<sup>6</sup> The fact that the outflow of Pakistani workers to the Middle East has been concentrated in twenty or so districts requires area-specific policy interventions, which are conspicuous by absence in the National Policy. In practical terms, this would entail, for instance, looking at the possibility of providing better credit, extension and marketing services and diversifying livelihoods in rain-fed agricultural districts. There are strong reasons also to seriously consider the argument that emigration opportunities and infrastructure is perhaps not equitably distributed across the country. There may be a case for affirmative action to provide emigration opportunities to the poorest regions of the country, including Thatta and Badin, which have not had much of a share of benefits accruing from international migration.

<sup>7</sup> The provision ostensibly aims at preventing women from sexual exploitation abroad. The official data provided by BoE does not even disaggregate the numbers of emigrants by gender. Officials at the Bureau maintain that only a few hundred women workers, mostly in the professional categories of nurses, doctors, and teachers, emigrate every year. The pattern makes for a sharp contrast with the international feminization of migration with half of all migrant workers globally being women.

Climate change related drivers of migration can essentially be divided into (a) processes such as sea level rise, salinity of agricultural land, growing water scarcity, reduced rain falls, and (b) climate events such as glacial lake outbursts, floods and cyclones. To many in the Indus Delta, these processes and events are a palpable reality. Some level of migration as an adaptive response to climate stress is already apparent in the Indus Delta. It is often combined with other adaptation efforts such as a change in livelihood or greater abstraction of natural resources.

The official policy lens, which views migrants as commodities to be exported, is no longer tenable. As a first step, we need to broaden our understanding of migration, both internal and external, as a nuanced and dynamic phenomenon taking place within existing power structures. The picture is complex; the ability to migrate is a function of mobility and resources. In other words, the people most vulnerable to climate change are not necessarily the ones most likely to migrate. Also, as Meena Singh has argued in the context of South Africa, “we need to recognize that their vulnerability to becoming environmental victims may greatly be reduced by appropriate policies and human action” (Singh 1998:117). Restricting people’s ability to move within a state’s borders is a negation of basic freedoms and is hard to support. However, climate induced migration can in fact trigger or exacerbate environmental conflicts. The resentment that representatives of fisher folk hold against Bangladeshi “immigrants” for allegedly siphoning off indigenous resources is a case in point.

Against this backdrop, Pakistan requires a migration policy as distinct from a narrow “Emigration Policy” to look at a range of issues within which migration can play out in the future. In substantive terms, such a policy would identify:

- a) agro-economic zones, which are likely to generate migrants and the potential destinations based on historical trends and social connections;
- b) types of livelihood diversification, which could allow people to have decent lives where they originally belong;
- c) destinations which can afford to accommodate an influx of population without drastically affecting host population and the local environment;
- d) measures to involve existing migrants with sustainable development initiatives in the areas they come from;
- e) means to enhance disaster preparedness capacity to preempt avoidable population movements<sup>8</sup>;
- f) mechanisms to ensure that the freedom to move is not restricted by class, gender, religious and other social barriers;
- g) a plan of action for resolving existing conflicts over natural resources
- h) options available for re-settlement of communities from severely stressed or disaster prone habitats into peri-urban areas with employment opportunities in industry and agriculture provided for.

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<sup>8</sup> As we report under the survey findings, the involvement of community members in preparation of District Disaster Plans has been only minimal despite official claims to the contrary. Also, the district plans for both Badin and Thatta completely sidestep the need for preserving mangroves as the first line of defense against storms and cyclones.

## 1.2 The Indus Delta: Flipside of Development?

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Occupying an area of about 600,000 hectares and with a coastline 250 kilometers, the Indus Delta is the fifth largest delta in the world (IUCN 2003:1). It consists of 17 major creeks, mudflats and an estimated 129,000 hectares of mangrove forests between Karachi in the West and the Rann of Kutch in the South. The source of fresh water and silt is the Indus river, which falls in the Arabian Sea at Ketu Bundar in Thatta District. Thatta and the adjoining Badin district have a combined estimated population of 2.7 million in 2010<sup>9</sup>.

District Thatta comprises of nine *talukas* or sub-administrative units. Out of these, six *talukas* Jati, Ketu Bundar, Khari Chan, Mir Pur Sakro, Ghorabari and Shah Bundar are coastal, while Mirpur Bathoro, Sujawal and Thatta are non-coastal. District Thatta is bounded on the North by District Jamshoro and on the West by Karachi's Malir District. To the East lie Districts Hyderabad, Badin and the Indian border and to the South the Arabian Sea and the Rann of Kach.

District Badin has five *talukas* at present: S.F Raho and Badin being coastal and the remaining three, Talhar, Matli and Tando Bago non-coastal. To its North West, the district shares a border with Hyderabad and to North East with Mirpurkhas. District Badin is bordered by the desert district of Tharparkur to the East.

The Indus River, which formed the lifeline of agriculture and fishing in the deltaic region, is currently contributing a fraction of its historic fresh water and silt into the Arabian Sea. Abstraction of water upstream through a series of dams, barrages and link canals has significantly reduced freshwater flow downstream Kotri Barrage<sup>10</sup>. According to the National Institute of Oceanography, there has been a reduction in the flow of fresh water to the Indus Delta from 140 Million Acre Feet (MAF) to less than 10 MAF over the last 50 years (Inam et al: 2).

Kotri Barrage, constructed in 1962, is considered the main contributor to reduction in fresh water flows into the delta. Prior to its construction, there were no days without water discharge downstream. Number of days per year when no fresh water discharge was observed downstream Kotri had increased to 200 days by the year 2000. At present, annual freshwater flow downstream Kotri is estimated to be far lower than 10 MAF per year, the minimum level of environmental flow stipulated in the 1990 Water Appointment Accord (WB 2005a : xvi).

As Amir (2005: 22) has argued, and as the present author found out in interviews with some key informants, even that figure is not considered adequate by many to maintain deltaic ecosystems and local livelihoods. On the other hand, a government commissioned study by an international panel of experts (IPOE) in 2005 suggested a minimum environmental flow of 6 MAF per year downstream Kotri (Gonzalez et al 2005: 13).

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<sup>9</sup> Population projected using intercensal growth rate, which comes very close to projections made by the National Institute of Population Studies (NIPS). Badin at 1.38 million has a slightly higher percentage than Thatta, which stands at around 1.32 million.

<sup>10</sup> Some experts put the figure of mangrove cover to as low as 70,000 hectares. Interview with Tahir Qureshi, IUCN. Also see Pakistan Fisher Folk Forum (2005: 48).

The IPOE recommends that a total volume of 25 MAF in any 5 years period (an annual equivalent amount of 5 MAF) be released in a “concentrated way as flood flow (*Kharif* period) to be adjusted according to the ruling storage in the reservoirs and the volume discharged in the four previous years”<sup>11</sup>. While these figures may not go down well with environmental activists-and that is perhaps the reason the study has not been publicized-the experts who did the study clearly acknowledge that post-Tarbela flows downstream Kotri have been as low as 1.8 MAF in an average year and 1.7 MAF in a dry year. The findings also acknowledge degradation of the delta in addition to accumulation of the silt in the Indus Basin.

While the quantum of minimum environmental flows may continue to be a bone of contention, there is ample evidence confirmed even by the findings of IPOE, that lack of fresh water has had major effects on the deltaic ecosystem and livelihoods: the sea water has intruded inland up to 1.2 million acres, rendering what was once fertile agricultural land extremely saline<sup>12</sup>; salinity of the seawater itself has increased<sup>13</sup>, which is detrimental to the growth of mangroves; coastal stability has been affected due to lack of sediments flow ; quality of surface water aquifers has deteriorated; and finally, certain species of fish, which were dependant on mangroves and fresh water, have become almost extinct<sup>14</sup>.

Districts Thatta and Badin have suffered a series of natural disasters in the past few years, the most recent one being a cyclone in 2005, which destroyed over 1500 houses in the two districts. Earlier in 1999, an even bigger cyclone hit the region, killing at least 550 people (UNDP 2008 a: 31; UNDP 2008b: 30). The sea water intruded into the irrigation land through the tidal link of the Left Bank Outfall Drain (LBOD) aggravating the loss of life and property.

Historically, people in the region depended on flood irrigation, growing crops after the recession of floods in the *Kharif* season. Rice was the main crop and an export commodity. Red rice, a crop cultivated in the active delta, has long since disappeared. Following the construction of the Kotri barrage, certain areas in Thatta and Badin turned to perennial irrigation (Hasan 2009, 125). That involved reclamation of land through de-logging. Perennial irrigation also led to the twin problems of salinity and water logging. There was inadequate draining because of the relatively flat topography of the region. While agriculture still forms a source of livelihoods for at least 50% of the population, many small farmers and share croppers turned to fishing after losing agricultural land to seawater intrusion or lack of fresh water for cultivating crops in what can be seen as an adaptation measure.

Adaptation in crop selection has also occurred, albeit on a relatively low scale. By 1980s, farmers had phased out mango and guava, which required a steady supply of water, with coconuts and

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<sup>11</sup> *Kharif* refers to the winter season and *Rabi* to the summer season.

<sup>12</sup> Some experts believe seawater intrusion to be a result of the Indus delta being subjected to the highest average wave energy of any major delta in the world. Interview with Dr. Muhammad Mouazam, DG Marine Fisheries, Sindh.

<sup>13</sup> Interview with Dr. Shaukat Hayat Khan, Director General National Institute of Oceanography

<sup>14</sup> Most notable being *palla*, which swims upstream in certain seasons, and as such depends on a steady flow of fresh water.

bananas. Sugarcane also became a favoured option, especially for larger landowners because of favourable output price structure, even though it is known to consume a lot of water<sup>15</sup>. Similarly, while the historical red rice is no longer to be seen, paddy area still occupies the bulk as percentage of the cropped area. Share of major crops grown in Thatta and Badin in total cropped area and as percentage of farms is given in Table 1. As we shall see later on, this crop pattern seems to have seen some changes since the last Agricultural Census.

**TABLE 1: SHARE OF DIFFERENT CROPS IN FARM AREA AND AS PERCENTAGE OF FARMS**

Crop	Badin		Thatta	
	Crop Area as Percentage of Total Cropped Area	Percentage of Farms Reporting	Crop Area as Percentage of Total Cropped Area	Percentage of Farms Reporting
Wheat	15	33	13	24
Rice	43	68	56	80
Cotton	4	6	1	1.7
Sugarcane	16	35	11	17

Source: Agricultural Census 2000

Scoping study survey findings as well as some other studies point to a decline in the cultivation of rice and an increase in cotton (WB 2005 b: 11). A 2009 Government of Sindh document for example, reports the area cultivating cotton in Badin to be 23912 acres, showing a slight increase compared to the figure of 23571 acres reported in the 2000 Census (DDMA 2009 b: 26). The same document puts the cropped area for rice at 149350 Acres, indicating a threefold decline in the previously reported figures of 421781 acres.

<sup>15</sup> According to the Agricultural Census 2000, farms bigger than 100 acres had 24 % of cropped area comprising sugarcane compared to 11 % medium sized farms i.e. 12.5-25 acres.

Land fragmentation down the generation has resulted in an increase in number of smaller farms, even though the largest land holders still occupy a disproportionately large farm area. According to the Agricultural Census 2000, 34% farms in district Badin and 33% in district Thatta were less than 5 acres or marginal farms. Close to 45 % and 38 % farms in Badin and Thatta respectively fell in the category of small farms i.e. 5-12.5 acres. Large farms (above 50 acres) made up just 3% of the total farms in Badin and 4 % in Thatta. However, in terms of size, large holdings made up 27% of total farm area in Badin and 29% of the total farm area in Thatta, pointing to a significant concentration of land. Sharecropping, which has been in decline across Punjab and Sindh, is still widely practiced more so in Badin than Thatta<sup>16</sup>.

It would be pertinent to note that poverty in rural Pakistan is known to have strong links with landlessness. The richest 20% of rural households are on average more than 3.5 times likely to own agricultural land than the poorest 20% of rural households. Additionally, the richest 40% of rural households own agricultural land that is on average about 4 times larger than that owned by the poorest 60% (GoP 2009 a: 51). Interviews with key informants and local people also point to inadequate and substandard supplies of seeds, fertilizers and pesticides, and a lack of farm management knowledge, as serious issues<sup>17</sup>.

As a number of key informants held, many farmers have from time to time shifted to fishing when agriculture was no longer a viable option. This is particularly true in the case of Badin, which has historically been an agricultural district. Inland fishing was practiced on a small scale but coastal fishing was unheard of as the sea was a long distance off human settlements<sup>18</sup>. Steady decline in fresh water flow led people to turn to livestock, woodcutting and to fishing as coping strategies (WB 2005 b: 1). The change in livelihood patterns, especially in the lower belt is thought to have resulted in an added pressure on marine resources already on the

<sup>16</sup> In 2000, 51 % farms in Badin and 6 % in Thatta were reported to be tenant and owner-cum-tenant farms compared to the corresponding figure of 24 % for the Sindh province. The figure quoted for Thatta appears implausible given huge variance from the provincial average.

<sup>17</sup> Interviews with Nawaz Memon, Sindh Abadkar Board and Abdul Razzak Baloch, ADO Agriculture District Thatta.

<sup>18</sup> Interview with Iqbal Hyder, District Badin.

## Numbers of Fisher Folk

Available studies vary enormously in terms of reporting the number of people in the two districts engaged in fishing. According to official figures, some 400,000 people and their families depend on fisheries in Pakistan, both inland and marine (GoP 2009 d: 36). A World Bank document estimates that some 200,000 households in the coastal *talukas* of the district depend on fishing (WB 2005: 4). The figure appears to be leaning on the higher side when the total number of people engaged in fishing is taken into account. Additionally, not all households in coastal *talukas* are engaged in fishing. A study by the Pakistan Fisher Folk Forum, quoting Marine Fisheries Department, estimates the total number of fishermen in the entire province, both inland and marine, to be around 85,000 for the year 1998 (PFF 2005: 26). Data for the 11 years preceding 1998-which covers the time by which the arrival of irregular immigrants had stabilized-shows an increase of about 17% in the number of fisher folk. To account for those who may have switched to fishing from agriculture and factoring in a growth of even 50% over the years following 1998 would bring the figure to about 127500 for the entire province, including Karachi. The diverging estimates point to the need for a census to identify the exact number of individuals and households dependant on fishing in the two districts, including those who may have switched livelihoods over the past decade. The National Census lumps those engaged in fishing and agriculture into a single category, and is thus, most unhelpful as a source of secondary data.

decline due to lack of fresh water, use of inappropriate fishing gears and industrial, agricultural and household waste being dumped into the sea.

Fisher folk in the Indus Delta, and their representatives, have no doubts that fish catch has plummeted over the years. According to official figures, total fish production during the year March-July (2008-9) was 640,000 metric tons, out of which 390,000 metric tons was marine, and the rest inland. Data given in Table 2 would show that marine production has been on the lower side in recent years but it does not establish a clear downward trend. However, experts believe that an increase in sea water surface temperature is likely to affect fish production due to changes in phytoplankton composition. Already, there is evidence that the catch of certain species has declined<sup>19</sup> (PFF 2005: 75).

One thing that the government officials and activists agree on is that over-fishing and a steady rise in the number of vessels are a major cause for the stress on fish stock. Currently, total numbers of crafts engaged in marine fishing in Sindh province are estimated to be 16,000<sup>20</sup>. These include trawlers, gill netters, mechanized and sail boats. Use of inappropriate nets, which catch juvenile shrimp and fish, are usually ascribed to Bangladeshi immigrants. However, there is evidence that “local” fishermen also resort to using them<sup>21</sup>.

**Table 2: Fish Production in Pakistan (Source USAID 2008: 14)**

*Fish Production (000 MT)*

<b>Year</b>	<b>Inland</b>	<b>Marine</b>	<b>Total</b>
1989/90	113.2	369.8	483.0
1990/91	115.9	402.8	518.7
1991/92	121.6	431.5	553.1
1992/93	122.5	499.2	621.7
1993/94	139.5	418.6	558.1
1994/95	136.4	405.5	541.9
1995/96	160.2	395.3	555.5
1996/97	167.5	422.2	589.7
1997/98	163.5	433.5	597.0
1998/99	179.8	474.4	654.2
1999/00	176.4	438.4	614.8
2000/01	178.6	451.0	629.6
2001/02	183.3	454.5	637.8
2002/03	165.7	400.5	566.2
2003/04	403.0	573.5	976.5
2004/05	174.6	406.0	580.6
2005/06	179.9	425.0	604.9
2006/07	250.0	390.0	640.0

<sup>19</sup> Decrease in the catch of certain species may result in an increase in the landing of certain others, which may have to do with changing balance between predators and preys as pointed out in an interview by Dr. Muhammad Moazam, DG Marine Fisheries, Government of Sindh.

<sup>20</sup> Data provided by Marine Fisheries Department, Government of Sindh.

<sup>21</sup> Interviews with fishermen in union council Ahmed Rajo, District Badin.

Historically, the development of fishing as a market oriented activity has been traced back to the early 1960s when the government set up the Department of Fisheries (Hasan 2009: 125). Mandated to increase fish production and exports, the department provided loans for mechanized boats and nets and encouraged fishing on a commercial scale. The main market for the local catch was to be Karachi, then the only port. This soon led to the emergence of middle men who took upon the role of financiers, buyers and supplier of resources such as nets, fishing equipment, gears etc.

There are a number of sub-occupational categories within fishing in the delta region. Some work as *khalasis* or hired labourers who do not own boats or own only small ones. *Khalasis* get a share of the value of the catch after deductions have been made for diesel, net, food, share of the owner himself and so on. In many cases, fishing trips are financed by middle men who end up getting fairly large sums of the proceeds. Boat owners themselves end up being in debt to the middle men. In late 1990s, the government introduced a contract system, under which fishing rights were auctioned by the Sindh Fisheries Department and given to large contractors. The latter were accused of engaging the small fishermen on exploitative terms and conditions. Following years of protests by the Pakistan Fisher Folk Forum (PFF) the government withdrew the system. Currently, small fishermen are, on paper at least, free to work independently by obtaining a license. Interviews with local people revealed that the role of middle men is not necessarily viewed negatively by fishing communities. In the absence of institutional sources of credit, the middle men provide many of them security by lending money in lean or prohibited seasons or during lean fishing trips.

Contamination of marine resources as a result of discharge of urban and industrial waste is a serious issue threatening marine resources. Karachi alone generates 450 million gallons of sewage per day, most of which enters the sea untreated<sup>22</sup>. Much of the effluent generated by industries is also dumped without treatment despite provisions in the Environmental Protection Act 1997, penalizing such practices. In district Badin, the Left Bank Outfall Drain (LBOD), which was meant to provide a drainage system to counter salinity and water-logging, is widely believed as a source of agricultural effluents and pesticides residues discharged into the sea at Zero Point.

Capturing these and some other issues, PFF has prepared a draft Sustainable Fisheries Policy to cover both inland and marine fishing. The stated objectives are: “optimum utilization of fisheries resources by employing appropriate technology; maintaining proper environment for aquatic resources; and sustainable production that may assure continuous growth in fish resources” (PFF 2005: 25). The policy document proposes broader interventions to address issues of health, safe drinking water, and education, which concern the entire delta region, but are particularly acute in the case of coastal communities.

A combination of insecure livelihoods, a threatened natural resource base, and inadequate public services infrastructure, has left the two districts way behind most others within the province of Sindh. A comparative analysis of key health indicators in selected districts of Sindh would help underscore the point. As Table 3 below shows, districts Badin and Thatta score fairly poor compared to their neighbours in terms of the percentage of population having access to adequate sanitation, deliveries attended by a skilled birth attendant and contraceptive prevalence rate.

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<sup>22</sup> Interview with Dr. Muhammad Moazam, DG Marine Fisheries Department, Government of Sindh.

**Table 3: Key Health Indicators for Selected Districts in Sindh Province**

S. No.	District	Adequate Sanitation (percentage of households)	Infant Mortality Rate (The rate of infants dying per 1,000 population)	Under-5 malnutrition	Ante-natal by trained personnel	Delivery by skilled Birth Attendant	Contraceptive Prevalence Rate
1	Badin	31	87	48	35	21	6
2	Ghotki	51	88	48	28	20	17
3	Hyderabad	61	68	39	50	50	20
4	Karachi	67	40	28	73	79	23
5	Mirpurkhas	30	85	47	48	30	18
6	Nawabshah	53	88	48	49	36	9
7	Shikarpur	73	85	47	27	16	10
8	Thatta	23	91	49	22	23	10

Source: Nishtar 2008: 272

With regard to education, Sindh Education Management System (SEMIS) data for the year 2001, shows the two districts among the worst in Sindh province. Participation rates at the primary level for girls were 26% in Badin and 30% in Thatta compared to the corresponding figures of 34% in Hyderabad. At the middle level, participation rates (10% for Badin and 8% for Thatta) were only marginally better than those reported for Tharparkar. Over 90 % girls in Badin and an even higher 97 % in Thatta in age group 10-12 were out of school. More recent data show notable changes in the level of enrolment at primary level for girls in district Badin where the number of public schools has also increased over the past nine years (GoS 2010).

Even then, availability of public schools especially at middle and secondary levels leaves much to be desired. For a district with a population exceeding 1.3 million, Thatta has only 59 middle schools, including 17 for girls. Number of high schools in the district comes to 53, of which 15 are for girls. District Badin has higher number of middle schools (109) out of which 79 are for girls. At the higher level, the district has 53 high schools-13 for girls, 15 for boys, and the rest mixed (AEPAM: 14, 318). Most of these schools are devoid of basic facilities as depicted in Table 4.

**Table 4: Availability of Basic Facilities in Public Schools**

Level	Type of Facility	District Thatta		District Badin	
		Total Schools	Number of Schools where facilities are not available	Total Schools	Number of Schools where facilities are not available
Primary	Electricity	2714	1968	3176	2772
	Drinking Water		1296		1254
	Boundary Wall		1081		1212
	Latrine for Students		1127		968
Middle	Electricity	59	24	109	72
	Drinking Water		11		38
	Boundary Wall		10		21
	Latrine for Students		4		13
High	Electricity	53	15	53	2
	Drinking Water		10		7
	Boundary Wall		4		5
	Latrine for Students		7		3

Source: GoS 2010

What these indicators suggest is that the damage done to the delta eco-system and local economy has by no means been compensated through the provision of public services. Even if the region had retained its pristine ecological glory, the people would have been well within their rights to demand access to education and health opportunities. In the context of climate change mitigation, representatives from Pakistan and other developing countries make it a point to invoke the concept of historical debt. The argument goes, “since much of anthropogenic global warming is a result of industrialization in the West, it is they who should clean up the mess and finance us for adaptation and mitigation”. Applying the same line of argument, it is not the people of the delta who have essentially caused the damage to local ecology. Wouldn’t it be only fair on their part to ask those who have benefited most from upstream water abstraction to pay off the debt they owe?

The issue of compensation and making amends to the people who bear the brunt of unsustainable development practices opens up a moral minefield. However, in the context of the Indus Delta, we can no longer afford to shy away from addressing it. Some well-intentioned efforts have been made to monetize the economic losses suffered by the people on account of disruption of traditional livelihoods, depletion of mangroves, destruction of agricultural land and reduction in fish stocks (IUCN 2003). The problem with economic evaluation is that it tends to superimpose a monetary value on environment and ecology, which could lead you down a self-defeating path. Would it be all right to chop down mangroves, abstract water upstream, and let sea water intrude if you can somehow calculate the losses and pay those who are affected? Can we afford to perpetuate the dichotomy between development and ecology? What is at stake here is a whole set of cultural,

ecological, historical, scientific and aesthetic values and not just the economic ones. Economic values have to be weighted against others values at stake. And as Vandana Shiva has so eloquently argued, “the benefits and costs associated with human interventions and development projects need to be evaluated not only in terms of market economy but also in terms of the economy of natural ecological processes and the survival economy” (Shiva 1991: 71).

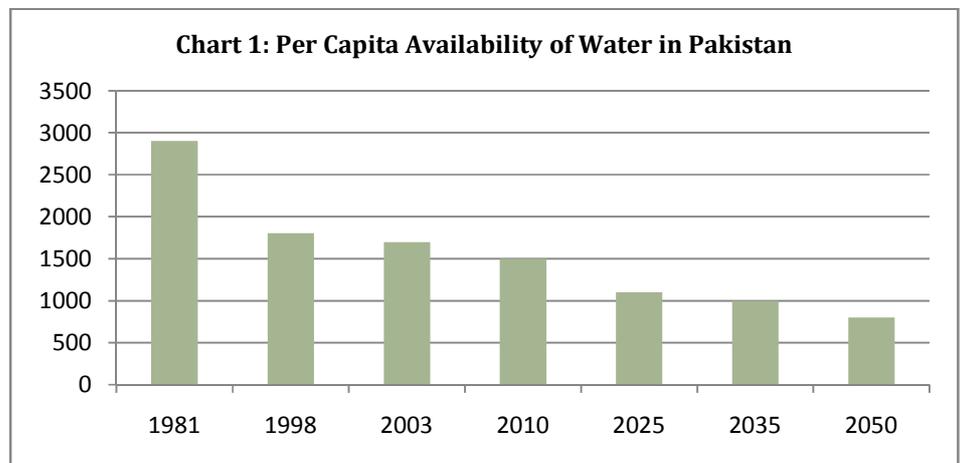
Effectively addressing the issues of the Indus Delta highlighted here require that we expand theoretical, ethical, spatial, temporal and social bases for the evaluation of economic progress and development. The theme carries over into the next chapter where we present an overview of water stress and climatic change before moving on to the analysis of our primary data.

### **To Build or not to Build: The Dam Debate**

*“Pakistan has to invest, and invest soon, in costly and contentious new large dams”, exhorts a World Bank (2005: xviii). On this account, Pakistan’s current storage capacity is very low compared to many other countries and the existing dams are suffering from high levels of sedimentation. Other authors are calling for new dams to store increased river flows as a result of Himalayan glacier melts projected in the medium term due to global warming (Amir, M ed. 2003). Dams are also considered necessary by some in the light of spatial and temporal variations in the rainfall that Pakistan receives. Critics who oppose the idea point out that increased glacier melts will also bring along loads of sediments making the argument for new dams weak. People in the Indus Delta are extremely sceptical when it is pointed out that with looming water scarcity dams may provide some security for downstream water users. They cite historical experiences, whereby the previous dams largely benefited agriculture upstream, while destroying delta ecosystem and livelihoods. Given the level of opposition to the idea of new dams, a more sensible route to take would be urgent investments in improving water-use efficiency in the existing system, rainwater harvesting and a shift toward drip irrigation from the highly wasteful flood irrigation. Establishing a system of water-use entitlements is equally necessary before toying with the idea of mega reservoirs. Also, the demand by people’s representatives that the Indus Delta be included as a party-in addition to the four provinces-in any future negotiations on new dams sounds reasonable.*

### **1.3 Water Stress and Climate Change: Looking into the Future**

Pakistan is among the most water-stressed countries in the world today. Current per capita availability of water is well below the threshold of 1800 cubic meters per capita per year, below which a country is considered water stressed. Projections suggest a water scarcity scenario in the year 2035 when the per capita availability falls down to 1000 cubic meters per year. Areas outside the Indus Basin are already classified as water-scarce (Amir, M ed. 2003: 193).



Source: Amir, Pervaiz (2005)

River flows have been continuously declining since 1996 and the overall availability of water has decreased considerably. With an arid and subtropical environment, natural precipitation occurring in Pakistan is very low. Over half the country receives less than 200 mm of annual rainfall. Apart from being low, precipitation is unevenly distributed over the seasons and across regions. Nearly 81% of river flow and 65% precipitation occur during the three months of the monsoon season. This also affects the quality of ground water which varies with depth and location.

Groundwater sources in turn have been overexploited with a phenomenal increase in the number of tube-wells since early 1960s. The flexibility of pumped water in contrast to inflexible canal water supply provided immense advantage to farmers,

especially in the Indus plains of the Punjab where quality of groundwater was good<sup>23</sup>.

Agriculture sector, which accounts for 92% of water use in the country, is also characterized by inefficient use of available water and low water productivity<sup>24</sup>. As shown in Table 5, yields for cereals both per hectare and per cubic meter of water are much lower in Pakistan than other countries in Asia (WB 2005 a: xvi; Khan 2005: 122).

**Table 5: Comparison of Cereal Yields in Pakistan with Selected Countries**

Country	Yield Tons/hectare	Water use for irrigation (% of Total)
Egypt	5.9	85
Korea	5.8	46
China	4.5	87
Pakistan	1.7	91

Access to irrigation water varies a great deal between farmers depending on the size of landholding and between head and tail-end users. Large landlords, for example those in district Badin, are known to be involved in water theft by using illegal direct outlets<sup>25</sup>. Water Users Associations (WUAs) are dominated by large farmers, especially in Sindh, allowing small land-holders little say in how irrigation water gets distributed.

National Agricultural Strategy 2008 acknowledges the need for efficiency of water use for the sustainability of agriculture in Pakistan and proposes a review of charges for canal water usage, financial incentives for efficient, sustainable and equitable water use (GoP 2008 e: 99). Better pricing for irrigation water is suggested as an incentive for diversification to higher value crops. Water pricing, however, is easier said than done, given the political economy of agricultural production in Pakistan, which is characterized by serious structural inequalities, rent seeking and political manipulation of the system.

Water pricing, economic valuation of water, and market based solutions to water management, suffer from an inherent weakness in that they do not adequately take into account various social and ecological externalities. Natural resources including water have instrumental values relating to human survival as well as inherent values, which cannot be measured in monetary terms. What is needed more is the establishment of a system of rights and entitlements to water use to ensure that small and marginal land-holders, those who depend on agriculture for food security, and those at the tail-end of the system, are not deprived of access to water for agricultural and domestic usage. As we brace for a water-scarcity scenario, state action and policy interventions are required not only for more efficient water use but also for developing cropping systems which are sustainable. In planning for the future, some experts argue, Pakistan will have to phase out water intensive crops

<sup>23</sup> In 2003, the estimated number of tube wells in the country was 688,000 compared to 32000 in 1965. Around 90 % of all tube wells are in Punjab.

<sup>24</sup> Industries and Domestic Use account for 3 % and 5 % respectively (GoP 2009 b: 11)

<sup>25</sup> Interviews with community members in Badin.

like sugarcane and rice<sup>26</sup>. Concomitantly, that would require a shift toward more appropriate and less water intensive crops, with support provided to farmers for effective supply and value chains and business development<sup>27</sup>.

One concept that can help make better, sustainable, and environmentally sound decisions in both industry and agriculture is that of Water Footprint (Hoekstra and Chapagin 2007). An offshoot of Ecological Footprint idea, the Water Footprint is an indicator of freshwater use that looks not only at direct water use of a consumer or producer, but also at the indirect water use. The water footprint can be regarded as a comprehensive indicator of freshwater resources appropriation, next to the traditional and restricted measure of water withdrawal. The Water Footprint of a product is the volume of freshwater used to produce the product, measured over the full supply chain. Rice, cotton, sugarcane and bovine meat are known to have very high water footprints, which do not get reflected anywhere in the official economic reporting<sup>28</sup>. Water footprints can also be calculated for nations or other geographically delineated areas.

Pakistan is among eight countries-others being India, China, the USA, the Russian Federation, Nigeria and Brazil- which are the largest consumers of the global water resources. However, the size of the national water footprint differs between countries. Developed countries with high levels of consumption, especially those related to industrial products, have higher national water footprints. Other factors that come into play include climate- in regions with a high evaporative demand, the water requirement per unit of crop production is relatively large-and water inefficient agricultural practices. Chart 2 presents per capita water footprints for selected countries with the contribution of different consumption categories. Pakistan's per capita water footprint is largely made up of consumption of agricultural goods but is noticeably higher than India, China and Japan.

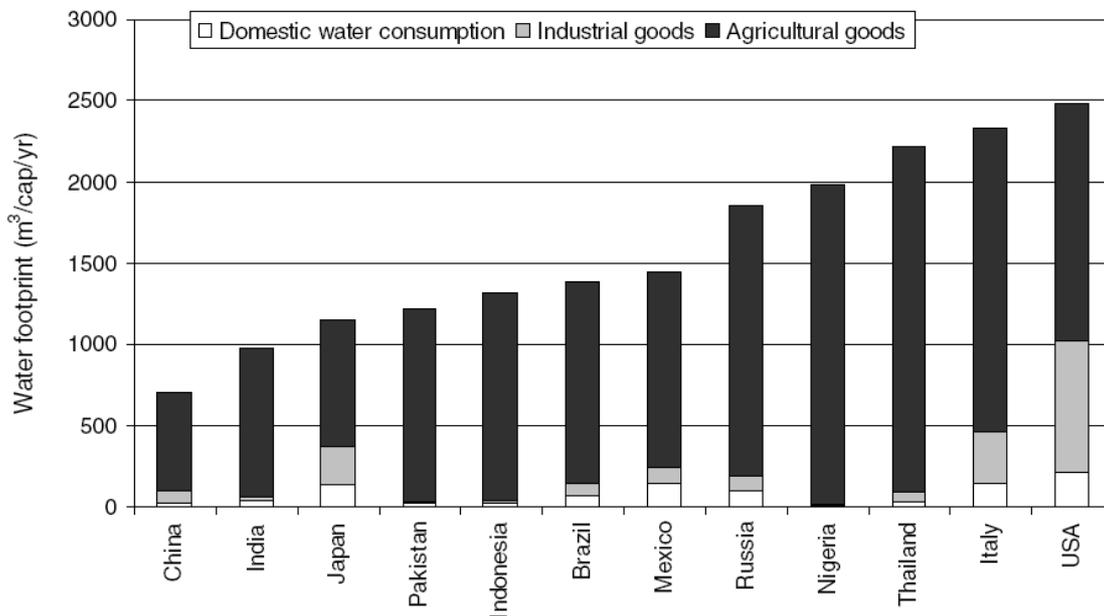
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<sup>26</sup> As we saw in the case of the Indus Delta, there are signs that farmers are already abandoning rice cultivation with fresh water flows becoming increasingly scarce. The discussion also draws on an interview with Ali Tauqir Sheikh.

<sup>27</sup> For an interesting discussion of value chains for wheat, rice, maize, and oilseeds, potato and other vegetables, see USAID 2008.

<sup>28</sup> As an example, see any issue of the Pakistan Economic Survey, and you only find foreign exchange earnings and contribution to GDP of various sectors and products regardless of the quantities of water involved.

**Chart 2: Water Footprint of Pakistan and Selected Countries**



As the issues of water availability play out in the context of climatic changes, decisions will have to be made not only in terms of monetary and foreign exchange value of different products but also on the basis of ecological and water footprints they leave behind. Water Footprint calculation can help us make wiser resource allocations and provide appropriate incentives across sectors, agro-economic zones and types of economic activity. An added advantage of using the concept is that it can help make urban consumers more aware of the impact of their consumption patterns on natural resources.

The fresh water resources of Pakistan are based on glacier melt and monsoon, both of which are sensitive to climate change. There is evidence that glaciers in the Himalayas are receding faster than in any part of the world (Amir, Muhammad 2003 a, 119; WB 2005: xvii). In addition to increasing the chances of GLOFs, glacier retreat is likely to contribute more water and silt flow into rivers before eventually disappearing altogether. We might see increased annual flows for a few decades followed by a decline subsequently (GoP 2009 b: 38).

Some analyses of meteorological data suggest a rise in temperature of 0.5 Celsius to 1 Celsius in the northern arid mountains, western dry mountains

### **Attabad Lake: Forerunner of Things to Come?**

By the last week of May, 2010, an estimated 13935 people had been displaced after landslides earlier in the year blocked the Hunza River in Northern Pakistan forming an artificial lake called, Attabad Lake. Water, more than 330 feet deep at places, was approaching the spillway and about to overflow by May 27. The landslides that caused the lake to form may well have been a result of seismic changes causing crevices that can lead to avalanches but some experts quoted in media reports clearly linked it with glacier retreats and as a prelude to more frequent formation of glacier lakes and their outbursts causing local floods.

and coastal regions during the period 1961-1990 compared to 1931-1960. On that account, out of 37 locations, 17 (including Badin) observed an increase of 0.1 to 0.4 Celsius of the highest maximum temperature during 1961-90 compared to 1931-60. There was a reduction in the highest maximum temperature from 0.4 Celsius to 2.6 degrees at 14 locations representing humid and sub-humid mountainous environments (Amir, Muhammad 2003b: 145-59).

The report of Pakistan’s Task Force on Climate Change indicates an increase in the area averaged mean annual temperatures of 0.57 Celsius over the period 1901-2000. Summer temperatures have reportedly increased in all parts of Pakistan during 1951-2000 (GoP 2009 b: 3). Precipitation trends show 10 to 15 % decrease in coastal belt and arid plains over the last 40 years and an increase in summer and winter precipitation in Northern Pakistan.

Sea level rise, although not as severe as in low-lying countries like Bangladesh, is still evident. According to the National Institute of Oceanography (NIO) tide gauge records of Karachi harbour for the past 100 years show that sea level has raised at about 1.1 mm/year. The institute believes that subsidence rates at the delta must have increased due to lack of sediment flux (Inam et al: 8). The frequency of cyclones forming in the Arabian Sea reportedly increased from 1.25 cyclones per year during the period 1891-1960 to 2.2 cyclones per year during 1992-1996<sup>29</sup>. Frequency of extreme climate events involving very high precipitation or high temperatures leading to floods and droughts also appear to have increased since 1990 (GoP 2009 b: 4).

Projected trends suggest temperature increases in both summer and winter to be higher in Northern Areas than in South; increase in summer precipitation for both Northern and Southern parts of the country; increased frequency and intensity of extreme events such as heat waves, heavy precipitation, droughts and tropical cyclones.

Possible future impacts of climate change in Pakistan in the light of observed and reported trends across selected themes and sectors are summarized in Table 6.

**Table 6: Possible Impact of Climate Change**

Area	Likely Impact
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<sup>29</sup> Cyclonic activity in the Arabian sea might also increase with a rise in sea surface temperature (GoP 2009 b:7).

Agriculture & Food Security	<ul style="list-style-type: none"> <li>• Changes in sowing season (time of soil moisture and temperature)</li> <li>• Increase in locust and insects due to high temperatures</li> <li>• Increase in wheat yields for a period due to increased carbon dioxide concentration, which are essential for photosynthesis</li> <li>• Loss of crops due to more intense rainfall, floods and drought</li> <li>• Higher incidence of livestock diseases</li> <li>• Increased water requirements for crops and animals due to high temperatures</li> </ul>
Coastal and Deltaic Populations	<ul style="list-style-type: none"> <li>• Increased exposure to cyclones</li> <li>• Reduction in fish production due to changes in phytoplankton composition</li> <li>• Greater seawater intrusion</li> <li>• Salinization of ground and surface waters</li> <li>• Cholera epidemics as a result of increased sea-surface temperature and sea-level rise</li> </ul>
Health	<ul style="list-style-type: none"> <li>• Increased mortality and morbidity from heat waves, floods and droughts</li> <li>• Greater incidence of malaria and other infectious diseases due to high temperature levels</li> <li>• Increased burden from malnutrition and diarrhea</li> </ul>
Women	<ul style="list-style-type: none"> <li>• Burden of looking after the sick</li> <li>• Dealing with malnourishment</li> <li>• Increased difficulties in finding water, fodder and fuel</li> <li>• Protecting, managing and recovering household resources during extreme events</li> <li>• Greater vulnerability to natural disasters on account of being confined to homes</li> <li>• Loss of agricultural livelihoods on which a large number of rural women depend as farm labourers and members of share-cropping families.</li> </ul>

Source: Maslin 2004; GoP 2009 b; Lancet Commission 2009

The report of the Task Force on Climate Change provides a comprehensive list of possible adaptation strategies across sectors and vulnerable ecosystems including coastal and the Indus Delta region. Implementation of mitigation and adaptation measures suggested, however, must be guided by an understanding of the fact that climate change will have its greatest effect on those who have the least access to resources. Social processes generate unequal exposure to risk by making some people more prone to climatic changes and extreme events than others. These inequalities are largely a function of the power relations operative in our society.

There are areas in climate change science, which are marked by uncertainty and inconclusive evidence. However, as the authors of the influential Lancet Commission Report remind us: “Uncertainty is not a reason to postpone or avoid action....all scientific work is incomplete—whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. This does not confer upon us a freedom to ignore the knowledge that we already have, or to postpone the action that it appears to demand at a given time” (Lancet Commission 2009: 1698).

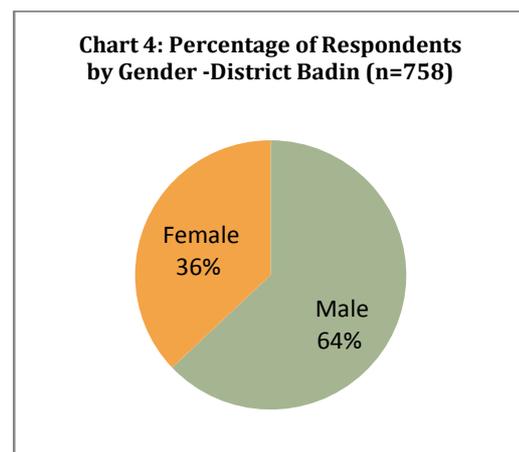
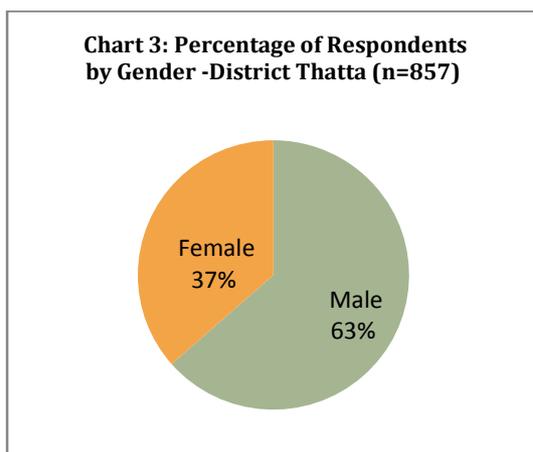
## 2. RESPONDENTS' PROFILE & HOUSEHOLD CHARACTERISTICS

The main source of primary data for the Scoping Study was the sample survey. Questionnaires were administered to 1615 households-857 in district Thatta and 758 in Badin. Across four clusters, seventeen sampled union councils were covered with an average of about four villages (localities in the case of urban union councils) in each union council<sup>30</sup>. The present chapter presents findings which provide useful insights into social, economic and demographic issues of the region across various groups and sub-regions and are essential to take into account when analyzing sector-specific issues and those related to migration.

### 2.1 Gender, Household Size and Age Profile

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With stratification done at the outset, women made up a sizable proportion of the respondents at 36.7% of the total. In no union council did the percentage of female respondents fall short of 30%.



With regard to marital status, 89.6% respondents were married and 7.3% had never been married. Interestingly, in the youngest age quintile i.e. 18-24 years, a sizable 38% reported their status as “never married” suggesting an increase in maiden age at marriage<sup>31</sup>. Slightly over 30% women in that age group said they had never been married.

Around 61% respondents were household heads. Among those falling in age group 25-29 years, a significant 46.5% were reportedly household heads suggesting a possible shift toward nuclear family headed by younger individuals or younger members in extended families taking up the role of household heads. Of those reporting to be household heads, over 13% happened to be less than

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<sup>30</sup> The clusters included: Upper Thatta, Lower Thatta, Upper Badin and Lower-Central Badin. List of union councils and *talukas* is given in Annex IV.

<sup>31</sup> According to the Pakistan Health and Demographic Survey, the median age at first marriage has increased by about half a year in the last 16 years, i.e., from 18.6 years in 1990-91 to 19.1 years in 2006-07.

29 years of age as can be seen in the Table 6. In the context of demographic change occurring in contemporary Pakistan, these statistics point toward the need for focusing attention on youth<sup>32</sup>.

**Table 6: Household Heads by Age Categories (Percentages)**

	Respondent is head of the household?		Total
	Yes	No	
Between 18-24 Years	2.7	19	9.1
Between 25-29 Years	10.7	19.1	14
Between 30-34 Years	10.4	14.2	11.9
Between 35-39 Years	15.8	14.9	15.4
Between 40-44 Years	17.1	11.1	14.8
Between 45-49 Years	10.3	5.6	8.4
Between 50-54 Years	12.1	6.1	9.7
Between 55-60 Years	13.5	5.6	10.4
Above 60 Years	7.5	4.5	6.3
Total	100	100	100

n=1588

Close to 41% households had three or less children, whereas another 15% reportedly had no children. These figures correspond with broader trends in fertility rates decline in Pakistan reported elsewhere<sup>33</sup> (NIPS and Macro International Inc. 2008: xx). However, average household size of the sample comes to 8.1 members, higher compared to the figures cited in the 1997 Census, and generally disputed by subsequent research on the Indus Delta. Lower Thatta and Lower-Central Badin with coastal and fishing populations have higher percentages of smaller households (1-5 members) compared to pre-dominantly agricultural upper clusters.

<sup>32</sup> The working-age population in Pakistan is bulging, the proportion of the younger ages (children) is declining and so is the dependency ratio (Arif and Nusrat 2008: 35).

<sup>33</sup> There has been a decline in the total fertility rate, from 5.4 children per woman in 1990-91 to 4.1 children in 2006-07, a drop of over one child in the past 16 years.

**Table 7: Household Size by Clusters (Percentages)**

Cluster	Household Size			Total
	1 to 5 Members	6 to 10 Members	11 and above Members	
Lower Thatta	30.3	49.2	20.4	100
Upper Thatta	25.2	54.4	20.4	100
Lower Central Badin	32.1	51.4	16.5	100
Upper Badin	20.8	61.0	18.2	100
Total	27.0	54.0	19.0	100

N=1594

In terms of age composition, those falling in the quintile 35-39 years and 40-44 years formed the largest percentages with 15% and 14% respectively. However, a significant 36% happened to be less than 34 years of age. That gives us a fairly balanced population mix to analyze findings against.

## 2.2 Out-of-School and Working Children

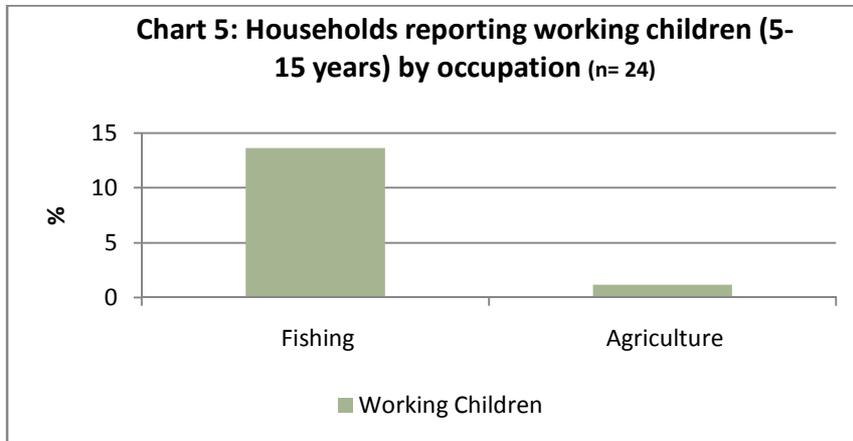
As many as 15% households reportedly had children 5-15 years who were out of school. Slightly over 11% households reported girls in this age group to be out of school and 12% reported boys to be out of school. At 80% and 75% respectively, union councils Keti Bundar and Kharo Chan in Lower Thatta, had the highest percentage of households reporting children to be out of school. In cumulative terms, Lower Thatta and Upper Thatta have higher percentages of households reporting out-of-school children compared to the two clusters in Badin.

**Table 8: Households Reporting Out-of-School Children (Percentages; n=1615)**

Of the total sample, around 1.5% households reported children in the age group 5-15 years engaged in paid work. Among these households, over 70% had only one working child and 0.4% and 0.6% had 2 and 3 working children respectively. Respondents belonging to minority Bheel community, and those from Mirbhar and Mallah castes mostly engaged in fishing, also reported some cases of working children. Across occupational categories most relevant to the present study, households from the fishing

Cluster	Households with <b>no</b> children (5-15 years) out of school	Households reporting children (5-15 years) out of school	Total
Lower Thatta	74.5	25.5	100
Upper Thatta	82.1	17.9	100
Lower Central Badin	90.4	9.6	100
Upper Badin	94.8	5.2	100
Total	85.0	15.0	100

communities had a substantially higher percentage of those reporting the presence of working children compared to agricultural families as depicted in Chart 5:



Half the households reporting working children said the combined income children brought home was less than Rs. 1000 a month. All the households belonging to Mallah and Mirbhar castes reported children’s monthly income to be less than Rs. 1000.

## 2.3 Religion, Caste and Mother Tongue

The sample was stratified with the aim of ensuring religious minorities’ representation in line with the available census data, which puts the percentage of non-Muslims in Thatta and Badin districts at 18% and 9% respectively (GoP 1998 a: 26, GoP 1998 b: 22). Over 15% of all survey respondents were non-Muslims. Religion has been used extensively as a variable in data analysis as the findings to follow will show. Non-Muslim respondents were interviewed in all but four of the 17 UCs surveyed.

**Table 9: Respondents’ Religion**

Religion	Percentages
Muslim	84.4
Hindu	14.9
Ahmadi	.1
Christian	.6
Total	100.0

n= 1615

Survey respondents belonged to at least 40 different castes. Khashkehli (9.3 %), Mallah (7.1%), Kohli (5.7%), Lashari (5.3%), Jokhio (4.8%) and Lashari (4.3%) formed relatively larger

proportions of castes represented in the sample. The overall mix shows presence of historically empowered as well as poorer and marginalized castes.

While those reporting Sindhi to be their mother tongue formed the largest group at 73.5%, there are significant percentages of other linguistic groups in selected areas. For instance, those reporting Seraiki to be their mother tongue form 9.5% of the sample; they make up over 27% of respondents in *taluka* Jati in Lower Thatta. Those reporting their mother tongue to be Balochi or Barochki, as it is locally known, reportedly formed 59% of respondents again in *taluka* Jati. Similarly, Punjabi speaking respondents made up a sizable 23% each in *taluka* S.F Raho and Matli in district Badin. The multiethnic composition of the delta's population needs to be kept in mind not only to follow through interrelated findings presented in this report, but also to plan future development in a socially harmonious and equitable manner.

**Table 10: Mother Tongue (Percentages)**

Mother Tongue	Percent
Sindhi	73.5
Seraiki	9.5
Balochi or Barochki	5.1
Punjabi	4.3
Pashto	.1
Marwari	5.4
Brahvi	.1
Urdu	.2
Other	.1
Gujrati	.7
Hindh	.9
Total	100.0

n=1614

## 2.4 Occupations, Household Income and Land Ownership

In more than half the households surveyed (54%), the respondent or a family member was engaged in agriculture. With slightly over 4% of the total sample, those reporting to be engaged in fishing formed a less than expected proportion of the occupational mix. However, households engaged in fishing made up a decent 11% of the sample in Lower Thatta, as can be seen in Table 11. As many as 40% respondents were reportedly engaged neither in fishing nor in agriculture.

**Table 11: Households Engaged in Fishing, Agriculture or Both**

	Fishing	Agriculture	Both	Neither of these	
Lower Thatta	10.8	52.7	.6	35.9	100.0
Upper Thatta	.8	39.2	1.3	58.7	100.0
Lower Central Badin	2.7	68.2	2.1	27.0	100.0
Upper Badin	.9	58.2	1.9	39.0	100.0
Total	4.1	54.1	1.4	40.3	100.0

n=1606

With regard to the respondent's own main occupation, close to 28% of the total (76% of women respondents) were housewives. Among main occupations other than agriculture and fishing, the larger categories were non-farm rural labourers (8%), industrial or urban labourer (6.5%), government servants other than school teachers (3.7%) followed by shop-keepers (3.2%) and school teachers (2.7%).

Of the total 2% reporting their occupational status as "seeking work", 29% fell in the age group 18-24 years, and another 39% in the group 25-39 years. While the overall level of unemployment may not be too high because of the predominantly rural nature of the Indus Delta, presence of relatively notable percentages of the young among the unemployed has to be a source of concern for future policy and programming.

In what could be taken as one indicator of prevalence of poverty in the Indus Delta, 12% respondents reported their monthly household income to be Rs. 2000 or less, over 27% between Rs 2001 and Rs 4000 and above 24% Rs 4001 to Rs 6000 a month. Cumulatively, close to 64% households surveyed had an income amounting to no more than Rs. 6000 or less than the officially sanctioned minimum wage in the country. As can be seen in Table 12, coastal UCs in district Thatta-Keti Bundar, Kharo Chan, Choubandi and Chach-all have very high percentages of those having a monthly household income of less than Rs. 6000 a month.

**Table 12: Monthly Household Income across UCs**

Union Council	Monthly Household Income						Total
	Up to Rs 2000	Between Rs 2001 to Rs 4000	Between Rs 4001 to Rs 6000	Between Rs 6001 to Rs 10000	Between Rs 10001 to Rs 15000	Above Rs 15000	
Uddasi	8.2	37.7	37.7	13.1	1.6	1.6	100.0
Mureed Khoso	1.0	15.5	30.9	43.3	9.3		100.0
Keti Bundar	5.0	40.0	40.0	10.0		5.0	100.0
Kharo Chan	19.0	23.8	19.0	33.3	4.8		100.0
Choubandi	9.9	36.0	31.5	11.7	7.2	3.6	100.0
Chhachh	6.4	17.9	19.2	41.0	11.5	3.8	100.0
Mehar Shah	6.0	44.8	27.6	16.4	4.3	.9	100.0
Kinjhar	20.0	60.0	20.0				100.0
Makli	5.6	22.2	22.2	33.3	8.3	8.3	100.0
Jhampir	4.8	39.8	21.7	18.1	8.4	7.2	100.0
Badin 3	28.3	10.0	15.0	21.7	21.7	3.3	100.0
Bhugra Memon	45.1	21.1	9.9	8.5	7.0	8.5	100.0
Ahmed Rajo	18.4	34.2	26.3	10.5	10.5		100.0
Saeedpur	41.4	17.2	3.4	13.8	10.3	13.8	100.0
Malhan			24.2	39.4	33.3	3.0	100.0
Pahar Mari			26.3	36.8	31.6	5.3	100.0
Khairpur Gambo	5.0	35.0	30.0	25.0		5.0	100.0
	12.0	27.3	24.4	22.9	9.4	4.0	100.0

n=1614

Between sectors, fishing at 11% and agriculture at 10%, had an almost equal number of those falling in the lowest income category. Among those reporting to be engaged neither in fishing nor in agriculture, the percentage is even higher at 13%. The finding points to the fact that those shifting from traditional livelihoods to non-farm rural labour or urban labour may not necessarily be all that well-off in economic terms.

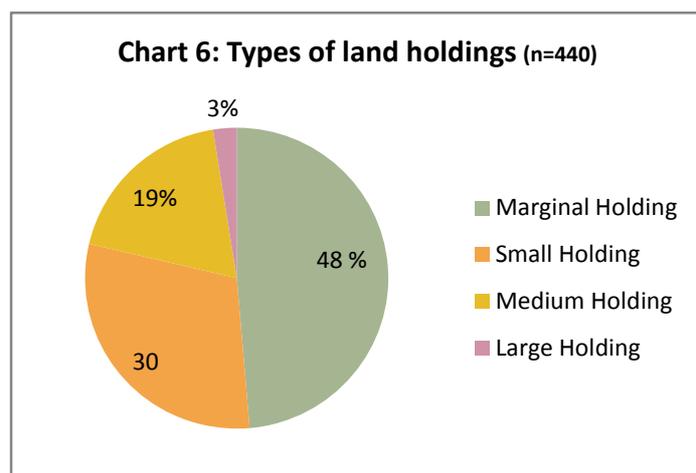
There appears to be a clear co-relation between land-ownership, size of land holdings and monthly household income. Out of 32% households who reportedly owned cropped or cultivated land, 26% fell in the lowest income quintiles (up to Rs. 2000 and up to Rs. 4000). The corresponding figure for those who owned no land was over 43%. Monthly household income is positively co-related with the size of landholdings, with those owning marginal (up to 5 acres) or small (6-13 acres) holdings having higher percentages of households in the lowest income categories. These survey findings provide a microcosmic picture of nationwide trends (GoP 2009a: 51).

**Table 13: Household Income across Landholdings by Size (Percentage)**

Landholding Categories	Up to Rs 2000	Between Rs	Between Rs	Between Rs	Between Rs	Above Rs
		2001 to Rs	4001 to Rs	6001 to Rs	10001 to Rs	
		4000	6000	10000	15000	15000
Marginal Holding	7.5	31.2	26.9	23.7	8.6	2.2
Small Holding	7.0	17.5	24.6	33.3	8.8	8.8
Medium Holding		11.1	11.1	36.1	27.8	13.9
Large Holding				50.0		50.0
Total	5.9	22.9	22.9	29.3	12.2	6.9

n=440

The size of landholdings themselves point to fragmentation of agricultural land into increasingly smaller units in line with the national trend reported in the 2000 Agricultural Census and subsequent studies (Khan 2005). Close to 49% of reported land holdings are marginal and 30% small. Only 19% and 2% of households reported to have the ownership of medium and large holdings respectively<sup>34</sup>.



## 2.5 Losses Suffered Due to Natural Disasters

As many as 57% respondents reported to have suffered some loss due to storms, rains or cyclones, and slightly over 43% due to drought during the past 5-10 years. All respondents in union council Keti Bundar, Thatta, and 97% in Ahmed Rajo, Badin, said they had suffered some kind of loss. Comparatively, Badin had a higher percentage of respondents reporting a loss because of rains or cyclones and Thatta a higher percentage of those reporting a loss due to drought. Given the fact that the last officially recognized and reported drought occurred in 2005 and that too of a low intensity

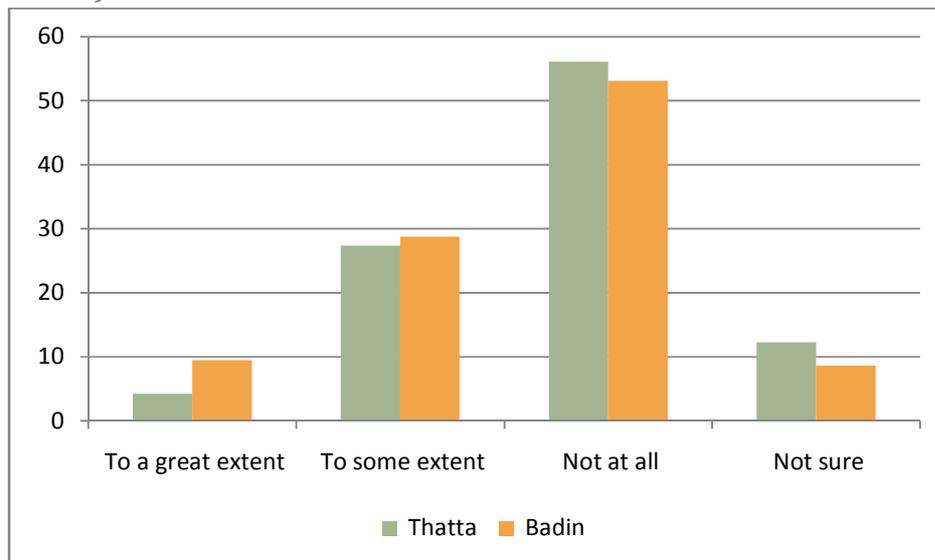
<sup>34</sup> Following the categorization used in official documents, the present study defines Marginal Land Holdings to be up to 5 acres, Small Land Holdings to be up to 13 acres, Medium Land Holdings up to 50 acres and Large Holding to be above 50 acres.

(DDMA 2009), it appears that many people interpreted the question to mean a lack of adequate water for irrigation<sup>35</sup>.

Of those reporting some loss because of rains, storms or cyclones, 38% in Thatta and 21% in Badin said they had suffered a loss to crops. Over 13% in Thatta and 20% in Badin reported a loss of livestock. Within those reporting a loss due to rains or cyclones, 54% in Thatta and 49% in Badin respectively said they had sustained some damage to their house. Across *Talukas*, Lower Thatta (83%) followed by Lower-Central Badin (75%) had the highest percentage of those reporting some loss as a result of rains, storms or cyclones.

Asked to what extent would they say they had recovered the loss they had suffered, just around 7% said “to a great extent” and another 28% “to some extent”. Close to 55 % said they had not recovered the loss at all and the rest were “not sure”. Most respondents saying they had recovered the loss “to some extent” came from Upper Thatta and Upper Badin.

**Chart 7: Extent to which Losses Suffered Due to Disasters Have Been Recovered (Percentage; n=1008)**



## 2.6 Drinking Water and Health Status

Overall, hand-pump was reported to be the main source of drinking water for a vast majority-77%-of the households with some regional variations. Lower clusters, including coastal areas in both Thatta and Badin, rely more on hand pumps compared to the upper clusters where tapped water inside or outside the house also forms the main source of drinking water for notable percentages of

<sup>35</sup> Over 70 % respondents in Upper Thatta and 67 % in Upper Badin reported a loss as a result of drought presumably reflecting the perceived dearth of fresh water available for crops, to the extent that it may resemble the conditions of drought for many. The Sindhi language used to conduct the survey has one word, which refers to drought as well as drought like conditions.

households due to the presence of urban areas. Four union councils, including Ketī Bundar, Khāro Chan and Kinjhar in district Thatta, and Bhugra Memon, Saeedpur and Ahmed Rajo in district Badin, did not have a single household reporting tapped water as the main source of drinking water.

Source of drinking water again has a co-relation with income level. Households in the lowest income quintiles have greater percentages of those relying on hand pumps and open wells compared to higher income groups.

**Table 14: Main Source of Drinking for the Household by Clusters (Percentage)**

Main Source of Drinking Water	Cluster				Total
	Lower Thatta	Upper Thatta	Lower Central Badin	Upper Badin	
Tapped water inside the house	1.3	8.2	.9	16.2	6.8
Tapped water outside the house	.4	8.2		7.8	4.2
Hand pump	86.8	64.2	82.6	74.3	77.2
Open well	1.5	13.8	15.3	1.2	7.2
Covered well		1.0	.3		.3
Pond	.9	1.0	.3		.6
Stream or river	5.4	2.8		.5	2.4
Purchased from supplier	3.5	.8	.6		1.3
Do not know	.2				.1
Total	100.0	100.0	100.0	100.0	100.0

n=1602

A vast majority of households do not treat drinking water, including those who use hand pumps as their main source of drinking water. Overall, only around 5% reported treating drinking water, the most common method being chlorine tablets, particularly among those using an open well. However, even within that category, 70% respondents do not treat water before drinking.

Asked what kind of disease symptoms respondents had suffered during the past six months, close to 32% mentioned diarrhea and 32.5% mentioned skin problems or rashes. Over 13% said they had had respiratory or chest problems and 11.5% mentioned lack of sleep. With regard to diarrhea, the highest percentage of respondents (32%) came from Lower Thatta, which as we have previously seen, has a high reliance on hand pumps as the primary source of drinking water. Prevalence of respiratory or chest related symptoms was found to be highest in Upper Badin followed by Lower Thatta. The latter also had a high percentage of respondents (41% of the total) followed by Lower Badin (21%) saying they had had watery eyes.

With regard to children, around 21% households (27% in Thatta and 13% in Badin) said they had had a child in family falling ill during the past three months. Across UCs, Khāro Chan in Lower

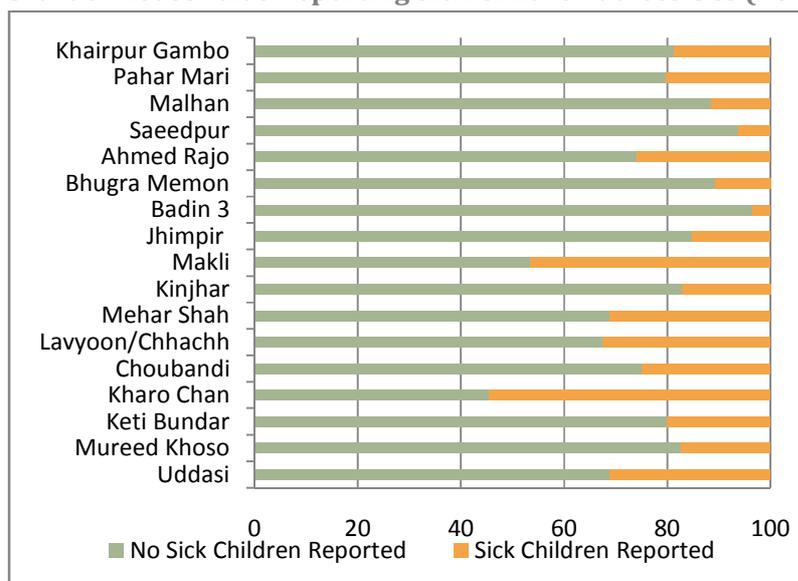
Thatta had the highest percentage within a UC (54.5%) and Badin 3 in Lower-Central Badin (3.4%) the lowest of households saying a child had been sick in the family during the past three months (Chart 8). Interestingly, households which do not report any children in the age group 5-15 years to be out of school, have a relatively low incidence of children falling ill compared to those who do report out-of-school children in the same age group.

**Table 15: Households Reporting Sick Children**

**(Percentage; n=1615)**

Children (5-15 years)	Sick Children		Total
	No Sick Children Reported	Sick Children Reported	
Households with no out-of-school children	83.3	16.7	100.0
Households reporting out-of-school children	56.8	43.2	100.0
<b>Total</b>	<b>79.3</b>	<b>20.7</b>	<b>100.0</b>

**Chart 8: Households Reporting Sick Children across UCs (Percentage; n=1615)**



In terms of health facilities, close to 70% of households said there was no health facility available within 5 kilometers distance to their place of residence. Around 4% each mentioned Rural Health Centre/Small Government Hospital and a Private Clinic or Hospital. District Badin, with 81%, had a higher percentage of respondents saying there was no health facility available within 5 kilometers compared to 70% in Thatta<sup>36</sup>. However, when asked to rate their satisfaction level with the available health facility, district Thatta had a higher percentage of those saying they were “dissatisfied” or “extremely dissatisfied” with it compared to corresponding figures for Badin. Across clusters, Upper Thatta has the highest percentage of respondents saying they were “dissatisfied” followed by Lower Thatta.

**Table 16: Satisfaction Level with Health Facility by Clusters (Percentage; n=346)**

Cluster Name	Satisfaction with the Health Facility Available within 5 km. Distance						Total
	Highly Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Highly Dissatisfied	Not Sure	
Lower Thatta	4.1	63.9	7.4	4.9	3.3	16.4	100.0
Upper Thatta	6.6	37.4	29.7	24.2	2.2		100.0
Lower Central Badin	2.1	60.4	20.8	4.2	2.1	10.4	100.0
Upper Badin	14.1	71.8	7.1		1.2	5.9	100.0
Total	6.9	58.4	15.0	8.7	2.3	8.7	100.0

It would be worthwhile to note that women, at 21.5%, had a noticeably high percentage than corresponding figure of just over 5% of those saying they were “dissatisfied” and “extremely dissatisfied” with the nearest available health facility. Equally importantly, over 13% female respondents, or double the corresponding percentage for men, said they were “not sure” if they were satisfied or dissatisfied with the health facility, possibly suggesting a lack of facilities for women or low exposure to the facilities.

## 2.7 Education and Literacy Profile

Overall, above 62% respondents said they had had no formal education. These included 84.3% of all female respondents and 57.2% of all male respondents. Only 12% women and 35% men said they could read any language. Lower Thatta has the highest percentage of those reporting to have had no formal education and Upper Badin the lowest. District Badin appears to fare slightly better than Thatta in terms of educational attainments (Table 17).

<sup>36</sup> Complete list of villages and union councils where all respondents said there was no health facility available within 5 km. radius is available in the dataset.

**Table 17: Respondents' Education Level by Clusters (Percentage)**

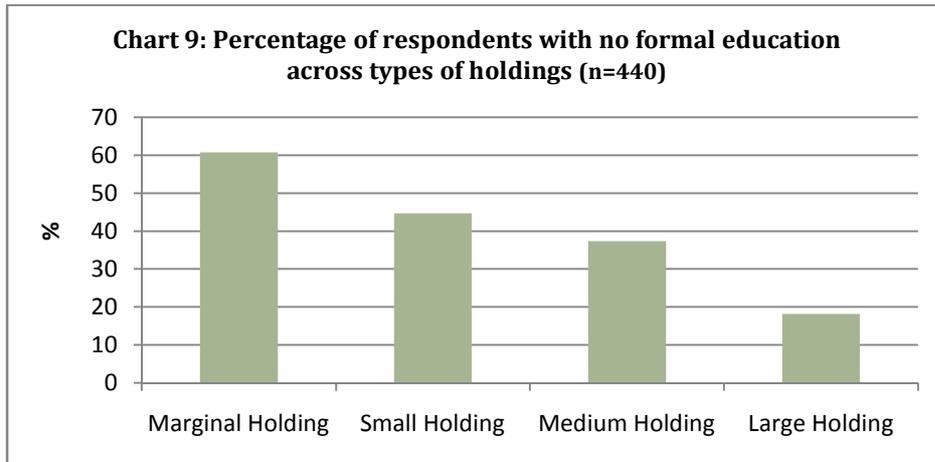
Education Level	Cluster				Total
	Lower Thatta	Upper Thatta	Lower Central Badin	Upper Badin	
No Formal Education	74.0	69.9	66.7	57.5	67.2
Below Primary	7.3	4.7	5.7	8.0	6.5
Primary	10.7	9.6	9.9	11.8	10.6
Middle	1.1	1.0	3.6	4.2	2.4
Metric	3.2	4.7	7.2	6.8	5.3
Intermediate	2.4	6.7	3.9	5.4	4.5
Graduate	.9	1.6	1.8	4.7	2.2
Masters	.4	1.8	1.2	1.4	1.2
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

n=1609

Education levels appear to have a positive co-relation with household income levels. Among those reporting a monthly household income of Rs. 2000, as many as 86% had had no formal education. The corresponding figure was less than 40% for those who reported household income in the range Rs. 10001 to 15000. Within the highest income category i.e. Rs 15000 a month or above, close to 11% respondent said they had a Masters degrees, whereas the percentage was 5.7% for those earning Rs. 10001-15000 a month and 2 % for those earning Rs. 6001 to Rs. 10000 a month.

Keeping in view the fact that majority of respondents belong to agricultural and fishing communities and not urban occupations or services, it could be assumed that higher education levels or some literacy allows better access to markets and leverage within local political economy translating in relatively better incomes. The findings can also be conversely interpreted to mean that larger monthly incomes have allowed education opportunities to family members. The former argument would appear more plausible though when we consider the fact that majority of respondents were household heads themselves.

The connection between education levels attained and economic position become clearer when we cross tabulate the data with the size of land holding. As Chart 9 shows, those with marginal land holdings have the highest percentages of respondents with no formal education. The percentage steadily declines as we move through larger holdings.



Within sectors, those reporting to be engaged in fishing have a higher percentage (72%) with no formal education, compared to 66% in agriculture and 67% for those involved neither in fishing nor agriculture. Within the latter category, 4.5% respondents were graduates and masters. The corresponding figures were 2.8% for agriculture and 1.5% for fishing.

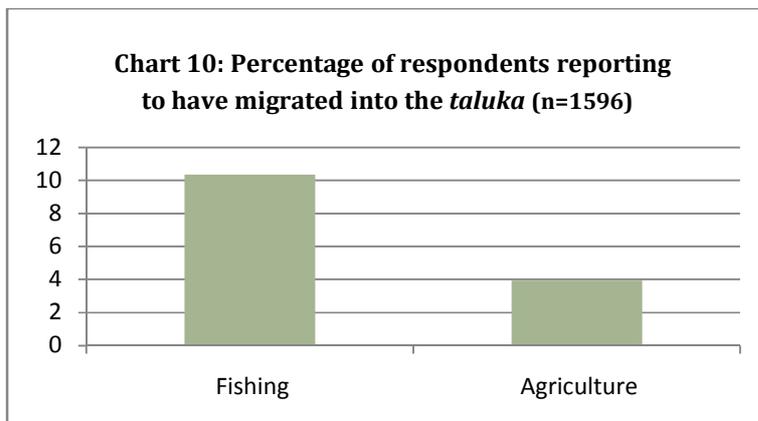
### 3. MIGRATION FROM AND WITHIN THE DELTA REGION

#### 3.1 In-Migration

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The 1998 census puts the numbers of migrants in Badin to 24,112 or 2.1% of the population, with migrants defined as those “who have moved out their residence from one administrative district to another”. The corresponding figure was just slightly lower for Thatta at 2.05% (GoP 1998a 140, GoP 1998b 205). Given the fact that the census data explicitly excludes population which may have moved within a district from the definition of “migrants”, the Scoping Study survey set out to gauge the migration across *talukas* within the delta in addition to the officially acknowledged form of internal migration<sup>37</sup>. Combined percentage for the two districts comes to 3.8% of the population, with Badin showing a slightly higher figure at 4.7% compared to 3.4% for Thatta. Badin appears to have received migrants, albeit in small numbers, from the adjoining Tharparkur district as well, where poverty levels are known to be very high.

Within Badin district, the highest percentage of those saying they had moved into the *taluka* from another one, came from S.F Raho in coastal Badin. Across the two main occupational categories, we find the percentage of in-migration, including inter-*taulka* migration, to be higher among fisher folk compared to those engaged in agriculture.



Across *talukas*, S.F Raho in Badin, had the highest number of respondents saying they had moved in from another *taluka* or district. S.F Raho’s proximity to Badin city and district Thatta might account for relatively higher level of in-migration. Another plausible explanation, as pointed out by some local key informants, is the trend in Badin of people shifting to fishing from agriculture due to reduced availability of irrigation water. The latter explanation appears to hold true given the fact that a sizable number of in-migrants reported their original place of residence to be Talhar and Tando Bago, which happen to be agricultural districts in upper Badin.

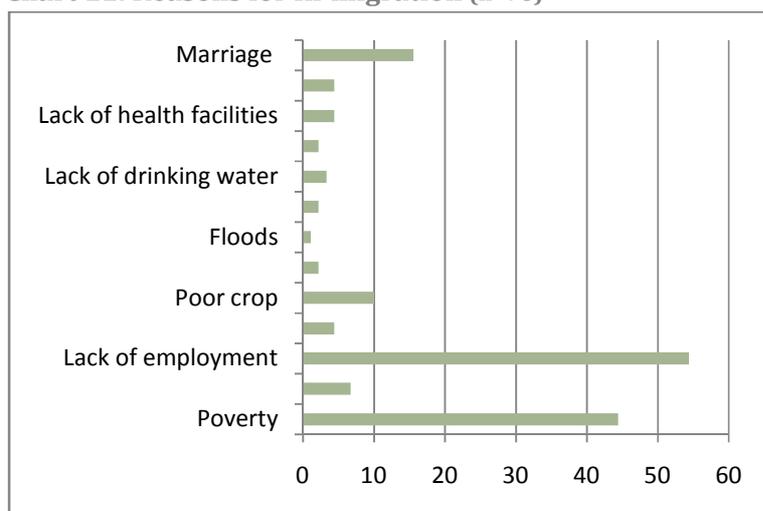
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<sup>37</sup> As Gazdar (2003: 5) points out, “the census is useful in identifying and enumerating people who have moved home across district boundaries, but does not identify people who might have moved home – even if this resulted in rural-urban migration within a district”.

Another *taluka* reporting a notable percentage of population (10%) to have migrated in is Mirpur Sakro, in coastal Thatta, bordering Karachi. Most in-migrants came from further up within Thatta district and a few from other coastal *talukas* of Jati and Kharo Chan.

On the reasons for migration, around 12% (all women) said they had changed residence as a result of marriage. Other reasons cited were poverty, unemployment, poor crops, lack of food and dearth of drinking water. The latter reasons explain relatively larger percentages of in-migrants in the two coastal *talukas* previously mentioned.

**Chart 11: Reasons for In-migration (n=78)**



The reasons cited above have to be seen in the context of timescale of in-migration. Well over 50% of all in-migrants reported to have changed residence within the past ten years, including 29% within the past 5 years. This may be an indication of a rise in poverty, water scarcity and livelihood problems in the delta over the past decade. Among those reported to be engaged in fishing, close to 10 % said they had moved in because of declining fish catch.

**Table 18: Year the Respondent Moved into the *Taluka* (Percentage; n=61)**

Cluster Name	Year of in-Migration					Total
	1-5 Years Back	6-10 Years Back	11-20 Years Back	21 Years Back or before	Do not Know	
Lower Thatta	42.3	57.7				100.0
Upper Thatta	15.4	3.8	50.0	26.9	3.8	100.0
Lower Central Badin	41.7	12.5	20.8	12.5	12.5	100.0
Upper Badin	7.7	23.1	23.1	30.8	15.4	100.0
<b>Total</b>	<b>29.2</b>	<b>24.7</b>	<b>23.6</b>	<b>15.7</b>	<b>6.7</b>	<b>100.0</b>

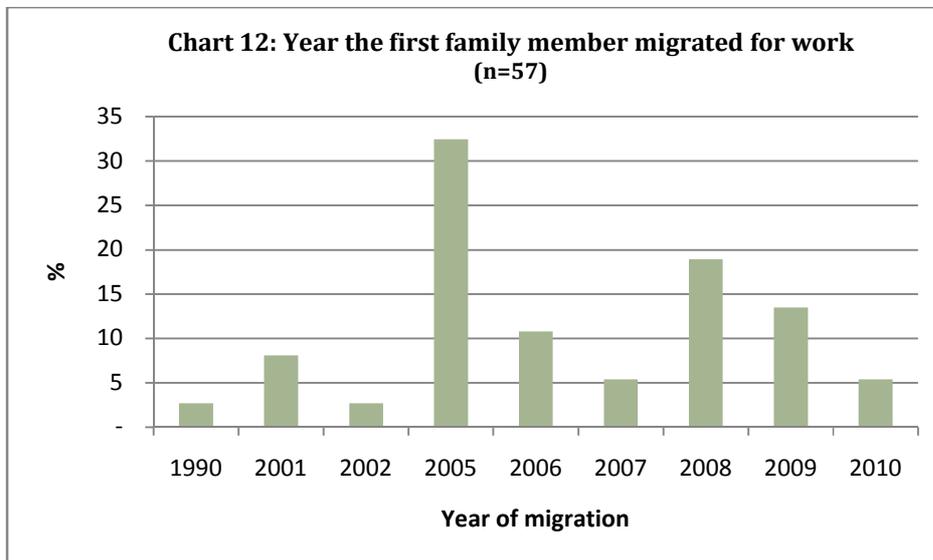
Within agriculture, over 12% said the reason they migrated out of their *taluka* to settle elsewhere within the delta was “poor crops”. The vortex of reasons that emerges portends a scenario where scarce resources in one sector may shift pressure toward another, eventually leading to livelihoods and resource extraction patterns which can not be sustained.

### 3.2 Labour Migration

Asked if the respondent had a family member settled in some other city or district for work, some 4% respondents replied in affirmative. Of these, around 60% said the family member(s) was working in another district or city and the remaining 40% said they were working within the district. Larger households (11 or more members) had a higher percentage of those reporting a family member working elsewhere compared to smaller households<sup>38</sup>.

As many as 76% said there was only one family member settled elsewhere and 17% said two members. Only around 8% mentioned three or more family members.

Based on the survey findings, we can safely say that labour migration from the delta is a relatively new phenomenon starting in 1990 or thereabouts. Most households reporting a household member working elsewhere said they had migrated in 2005 and 2008. That does not include whole families who may have moved residence from Lower Thatta to Karachi and now residing in coastal villages of Ibrahim Hyderi and Rehri. Some of them left their villages with entire families 30 years back following storms and seawater intrusion.

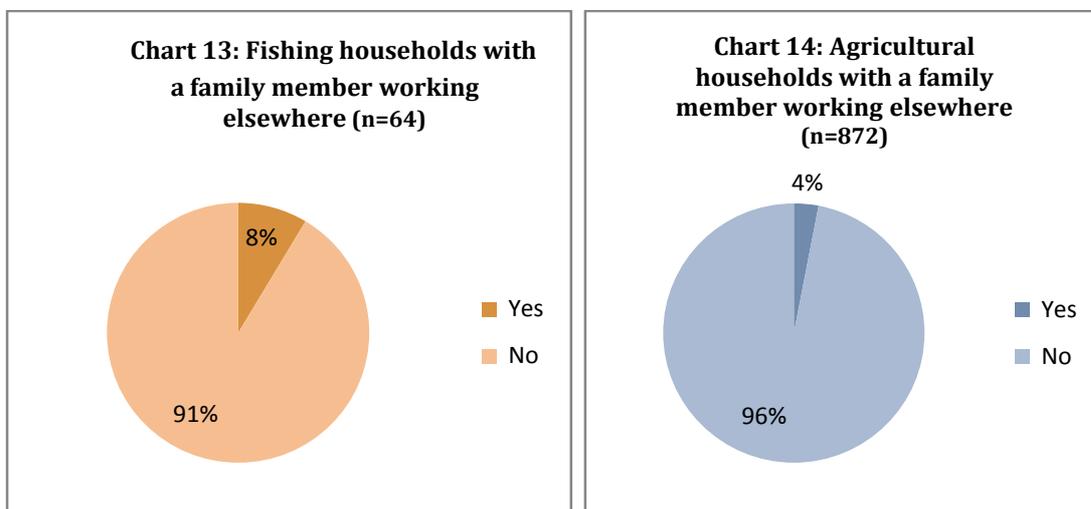


Excluding those who are settled within the district, 2.5% of the sampled households said they had a family member working outside the Indus Delta. Of all the households reporting a family member

<sup>38</sup> Larger households had 6.1 % respondents saying they had a family member settled elsewhere. The corresponding percentage was 2.9 % for households with 6-10 members and 1.9 % for those with up to 5 members.

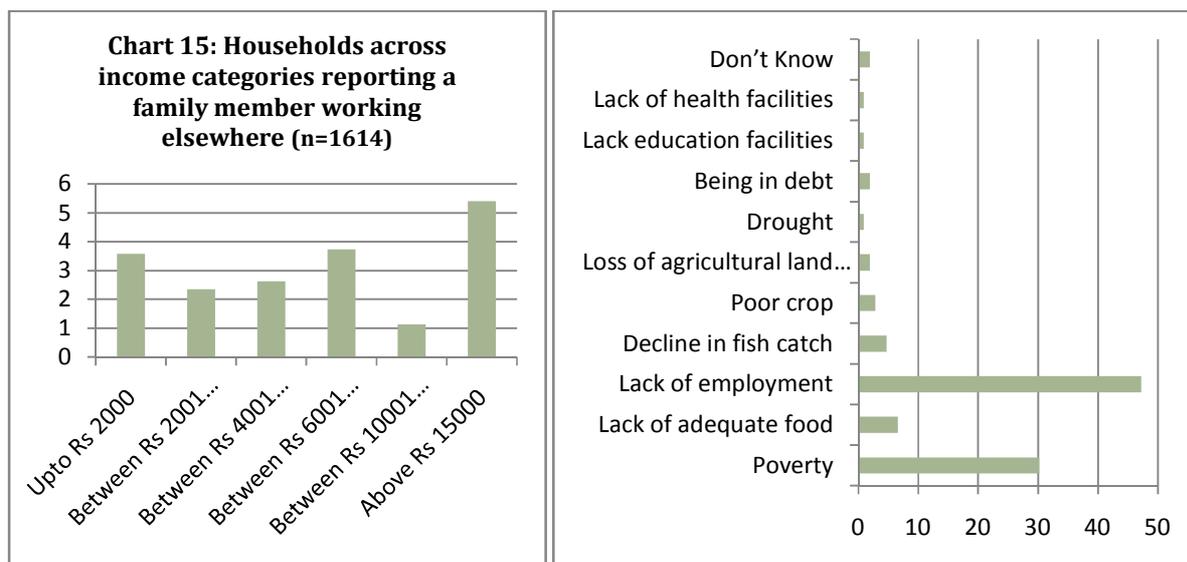
working elsewhere, 23% named Karachi as the destination and 11.5% each mentioned Hyderabad and Mirpurkhas. Other cities within Pakistan, where migrant workers have gone out from the delta, albeit in very small numbers, include Abbotabad, Lahore, Gawadar, Quetta, Sialkot and Nawabshah.

Of those reporting a family member settled in Karachi, 78% came from Thatta, with Lower Thatta having a disproportionately high percentage i.e. 50% of all such households. Upper Thatta (20%) and Upper Badin (17%) had notable percentages of migrant family workers settled in Hyderabad, even though it does not translate into huge numbers in absolute terms. Among households within district Badin reporting a family member working elsewhere, 34% mentioned Mirpurkhas bordering *taluka* Khairpur Gambo in Upper Badin as destination. Across occupational categories, we find relatively more households in the fishing sector and those engaged in both fishing and agriculture reporting a migrant family worker compared to those engaged only in agriculture.



In line with broader studies on migration, the survey reveals a greater propensity to migrate within the lowest income quintiles and the highest income quintiles (Addelton 1992, 79-98). As depicted in Chart 15, those in the highest income category have a comparatively larger percentage of households reporting a migrant family worker. However, in absolute terms they are outnumbered by the poorest as the latter make up a much larger part of the sample. Among those 36% mentioning “poverty” and “lack of food” as reasons for migration, fall a vast majority of the poorest. Those citing “unemployment” as the main reason include not only the poorer households but also those in the highest income bracket as they can be expected to look for better and well-paying jobs than what are available locally.

Scarcity of drinking water, cited earlier in this chapter and elsewhere as a major reason for migration, involves entire families packing up and moving to a new place within the delta or to some other city. In-depth interviews with migrant families in Karachi and with locals in coastal Thatta bear this out. Within the households engaged in agriculture, 7% and 5% respondents respectively mentioned poor crops and sea water intrusion or salinity as reasons why a family member had decided to migrate. Those mentioning poor crops as a reason for migration almost entirely came from small and medium landholdings and not marginal or large holdings.



**Chart 16: Reasons Family Member Migrated (n=106)**

Asked what kind of work the family member was doing at destination, over 35% mentioned private sector jobs, around 26% mentioned daily wage labour, 12% each agriculture and public sector jobs, around 4% fishing and some 3% said they had found no work yet. Disaggregated by destinations, data shows those in Karachi to be engaged mostly in private sector jobs and daily wage work besides agriculture. Those settled within Thatta and Badin districts but away from their original place of residence, are reportedly engaged in both private and public sector jobs and agriculture.

A sizable 39% of households with a family member working elsewhere said the member had incurred debt in order to migrate. At cluster level, the percentage was highest for Lower Thatta followed by Upper Badin. Across income categories, it appears incurring debt is not confined to lower income households. In fact, 50% respondents in the highest income category (15000 and above) reporting a migrant family member said they had incurred a debt in connection with migration.

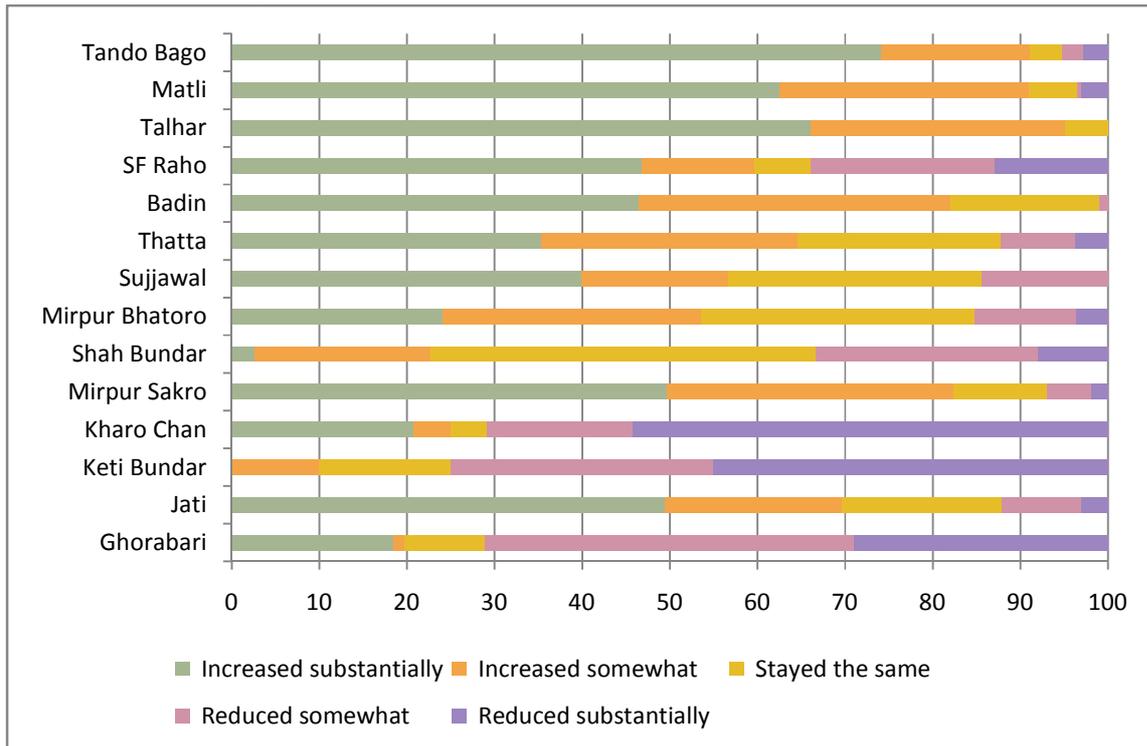
### 3.3 Changes in Village or Locality's Population

In line with the survey data on in-migration, district Badin has a higher percentage of respondents saying the population of their village or locality had increased substantially during the past ten years. Across clusters, Upper Badin at 68% had the highest percentage of respondents reporting a substantial increase in the local population. By contrast, Lower Thatta, with a noticeable trend of out-migration, has the highest percentage (12.5%) of respondents saying the village or locality's population had reduced substantially.

Both ends of the spectrum-those reporting a substantial increase in local population and those reporting a substantial decrease in population-merit attention. Pressures exerted on host

communities within the Indus Delta may in fact pose more serious challenges due to strained natural resources than the trials and tribulations of migrating out of the delta. Chart 17 provides a snapshot of changes in population across *talukas* as perceived by the local people. It shows a significant increase in Upper Badin’s Tando Bago, Matli and Talhar *talukas*, and a significant decrease in Kharo Chan and Keti Bundar in Lower Thatta.

**Chart 17: Perceived Changes in the Population of the Village or Locality across Union Councils (Percentage; n=1567)**



### 3.4 Remittances

Some 34% households with at least one family member working away from home reported receiving a monthly remittance. Over 45% said they received remittances “rarely” or “never”. As Table 18 shows, district Thatta has higher percentages of those saying they receive remittances “monthly” or “after a few months”. Relatively lower percentages for Badin may be put down to the fact that most migrants from Badin go to Mirpurkhas and rural Hyderabad to work as share-croppers or farm labourers. These occupations may guarantee survival for a migrant, but hardly allow for an amount set aside for sending home.

**Table 18: Frequency of Remittances Received (Percentage by Clusters)**

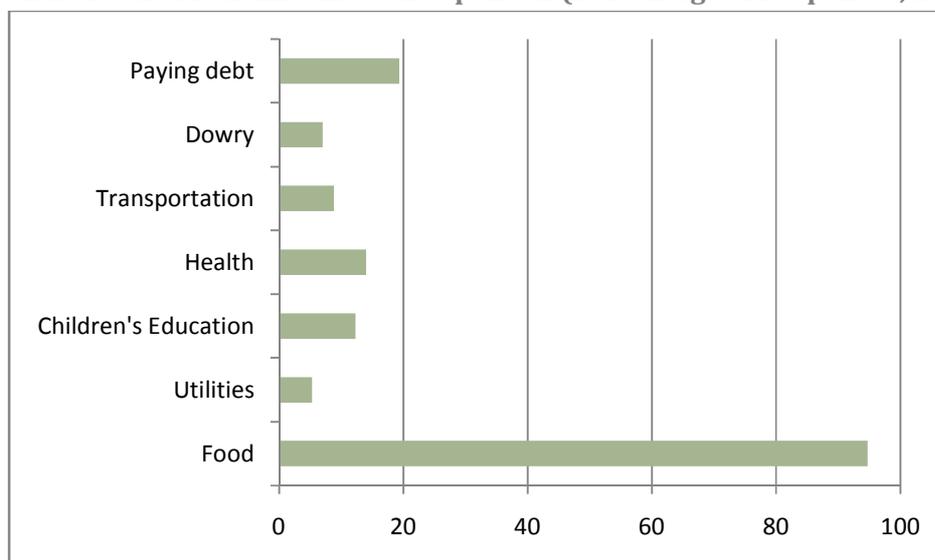
Cluster	Frequency of Remittances					Total
	Monthly	After a few months	Rarely	Never	Other	
Lower Thatta	38.5	30.8	15.4	15.4		100.0
Upper Thatta	52.0	16.0	12.0	16.0	4.0	100.0
Lower Central Badin	13.3	20.0	40.0	26.7		100.0
Upper Badin	23.5	11.8	35.3	29.4		100.0
Total	34.3	18.6	24.3	21.4	1.4	100.0

n=70

Across sectors, households engaged in occupations other than fishing and agriculture had a higher percentage of those saying they received a monthly remittance hinting at the involvement of migrants from these families in urban industries or private jobs. Agricultural households on the other hand, had the highest percentage across occupational categories of those saying they received remittance only “rarely” or “never”.

Echoing the larger studies on migration, the survey data reveals that remittances mostly get spent on recurring consumption (Adelton 1992: 142). Over 90% respondents mentioned food in addition to other heads the household spends remittances on. Close to 20% respondents checked debt payment as an expenditure head met through remittances.

**Chart 18: Heads Remittances are spent on (Percentage of Responses; n=92)**



Reinforcing earlier findings regarding comparative situation in the two districts with regard to education, the percentage of households in Badin reporting to spend part of remittances on education is three times higher than the corresponding figure for Thatta. Within Lower Thatta, the

percentage of households mentioning health and transport as heads on which remittances get spent on is highest (17% and 14% respectively) compared to all other clusters. Respondents from the minority Bheel community and Mallah, a fishing cast, mention “food” as the only household expense they use remittances for.

### 3.5 Emotional Cost of Labour Migration

As a proxy indicator of emotional and psychological costs of labour migration for those left behind, the respondents were asked if they were “happy” or “unhappy” to have a family member working elsewhere. Just over 26% said they were happy, close to 34 % said they were not happy, over 35 % said they were “neither happy nor unhappy” and another 4 % or so said they “could not say”. Significant percentages of respondents saying they are “not happy” to have a family member settled elsewhere, or having an ambivalence about it, point to a type of migration which inevitably exacts an emotional price. Seen in conjunction with reasons for migration mentioned earlier, subjective perceptions of family members left behind suggest that migration from the delta may essentially involve a struggle for survival rather than a means for upward mobility.

In a telling indication of how labour migration may affect men and women differently, the percentage of male respondents saying they were happy to have a household member settled elsewhere was almost 3 times higher than that for female respondents. Compared to men, women also show a greater degree of ambivalence by saying they are neither happy nor unhappy<sup>39</sup>.

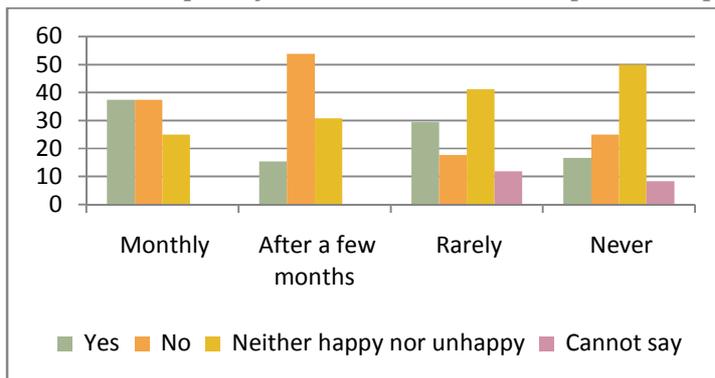
**Table 19: Perceptions about Having a Family Member Settled Elsewhere (Percentage; n=68)**

Would you say you are happy that a family member is working elsewhere?	Gender of the Respondent		
	Male	Female	Total
Yes	37.8	12.9	26.5
No	37.8	29.0	33.8
Neither happy nor unhappy	21.6	51.6	35.3
Cannot say	2.7	6.5	4.4
Total	100.0	100.0	100.0

<sup>39</sup> Social costs of migration and psychological impact on those left behind represent an under-researched area. In a recent piece of research done for the Sustainable Development Policy Institute (SDPI), Karen Siegman has documented psycho-social problems faced by women in Dir and Swat districts of NWFP following migration of husbands to the Gulf countries or to urban centres within Pakistan. According to that research, precarious employment contracts abroad, irregular transfer of remittances and the pain of separation from loved ones constitute major problems for women left behind. Women also complain of being rendered vulnerable to harsh treatment by in-laws once their husbands migrate. Even though in many cases families have increased disposable income, restrictions on female mobility imply that there is no significant difference on health or education status of girls and women. Also, the absence of men requires additional female hands to do daily chores such as collecting water, timbre for fuel, fodder for livestock etc. putting more pressure on women. With no male authority around to supervise boys, it was reported that there was an increased dropout rate among school-age boys.

There appears to be some link between the perceptions of household members left behind and the pattern of remittances. Within the families reporting to receive a remittance monthly, the percentage of those saying they are happy is higher than those who do not receive remittances at all or receive them intermittently. Across clusters, Upper Thatta has the highest percentage of those saying they were happy that a family member was working in some other place. The explanation may again lie in the fact that those from Upper Thatta being in proximity to major urban centres, may have had an opportunity to find relatively better work opportunities in Karachi and Hyderabad

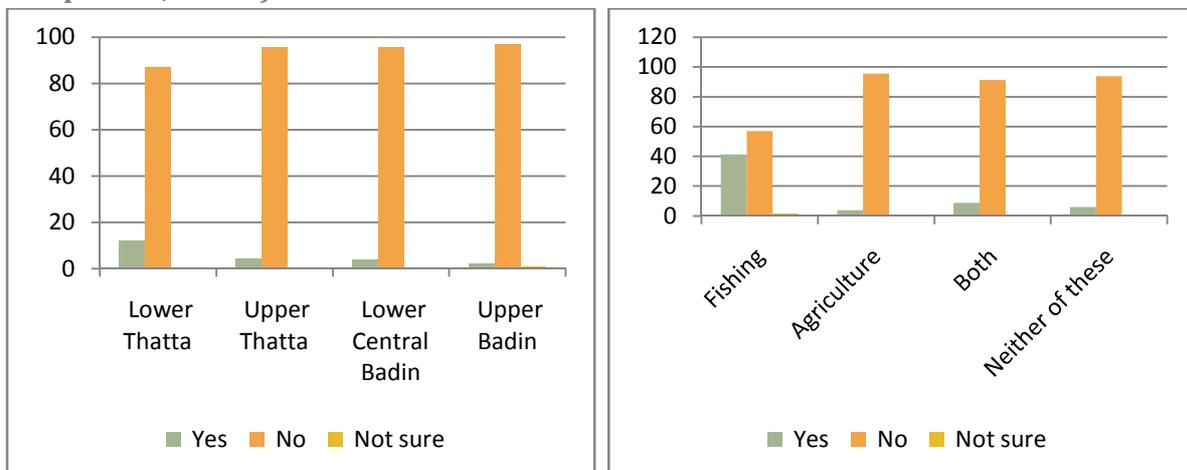
**Chart 19: Frequency of Remittances and Reported Happiness (n=70)**



### 3.6 Migration Plans

Overall, 6% respondents said they were thinking of migrating themselves, a figure 2 percentage points higher than the existing level of internal and external migration in the Indus Delta reported in the present study. The highest percentage of those saying they were thinking of migration comes from the Lower Thatta. Reinforcing the pattern of migration explained earlier, households belonging to the fishing sector have a higher percentage than the agriculture sector of those saying they are thinking of migrating themselves.

**Charts 20 and 21: Are you thinking of migrating yourself? (Percentages by clusters and occupations; n=1615)**



At 77% and 66% respectively, union councils Kahro Chan and Keti Bundar in Lower Thatta have the highest percentage of respondents mentioning migration plans than all other UCs. The percentage of respondents saying they are thinking of migration increases steadily as we move toward larger households echoing the existing pattern of migration.

**Table 20: Household Size and Plans for Migration (Percentage)**

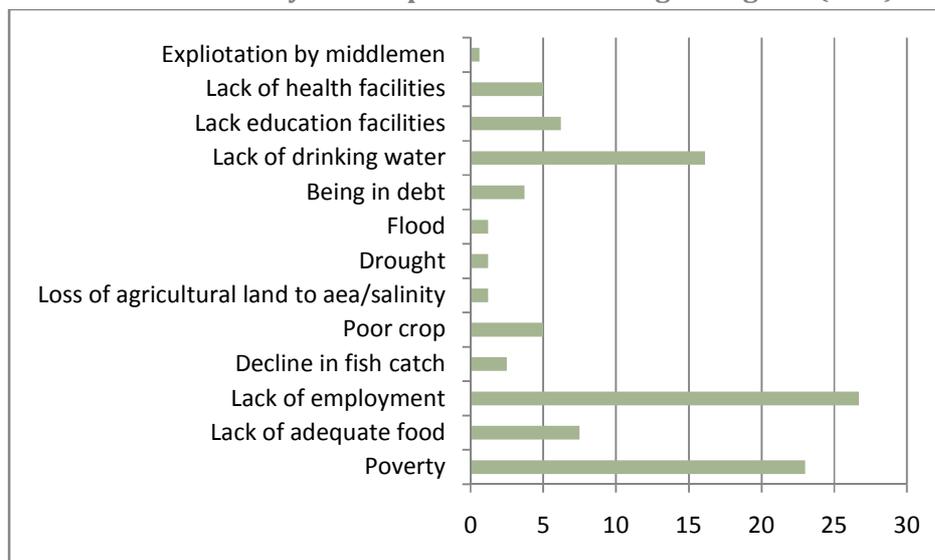
Household Size	Are you thinking of migrating?			Total
	Yes	No	Not sure	
1 to 5 Members	3.3	96.5	.2	100.0
6 to 10 Members	4.7	94.6	.7	100.0
11 and above Members	12.7	86.9	.3	100.0
Total	5.8	93.7	.5	100.0

n=1576

Close to 6% of those reporting to have marginal land holdings said they were thinking of migrating compared to the corresponding figure of just over 1% each for small and medium size land owners. Asked why they were thinking of migrating, most respondents again mentioned “poverty” and “lack of employment” as reasons. Poor or failing crops was frequently cited as a reason in Lower-Central Badin. As was the case with existing internal and external migration in the Indus Delta, most respondents citing “poor crops” as a reason for future migration plans happened to be small and medium-sized land-holders.

By contrast to the reasons mentioned for migration of a family member, 16% respondents (mostly from Lower Thatta) mentioned “lack of drinking water” as a primary or secondary reason why they were thinking of migrating. Since lack of drinking water, as against other typical causes of migration, involves entire families moving, we may be looking at potentially large numbers of people on the move in years to come. Scarcity and poor quality of drinking water, it must be borne in mind, is a fairly ruthless driver of migration in that a single family member or household head cannot have the “luxury” of moving out alone and helping those left behind with remittances. Other things being constant, remittances could only help certain families facing water shortages or poor quality of water provided potable drinking water is easily available through private suppliers- hardly an ideal scenario to begin with.

**Chart 22: Reasons why the Respondent is Planning to Migrate (n=95)**



### 3.7 Seasonal Migration

While the existing levels of permanent or longer-term migration within and away from the Indus Delta are not too large, a sizable 19% of respondents said they themselves or a household member had migrated during certain seasons over the past two years. While the percentage of households reporting a family member working elsewhere was higher in Thatta, district Badin has a relatively higher percentage of those reporting to have gone for seasonal work in the past two years. Much of seasonal migration in both districts, however, involves going to a *taluka* within the district.

**Table 21: Destinations for Seasonal Migration**

Where did you go to work in certain seasons during the past two years?	Percent
Within Thatta district	29.7
Within Badin district	39.8
Hyderabad	6.9
Mirpurkhas	9.3
Karachi	13.5
Other district or city within Pakistan	.8
Total	100.0

n=259

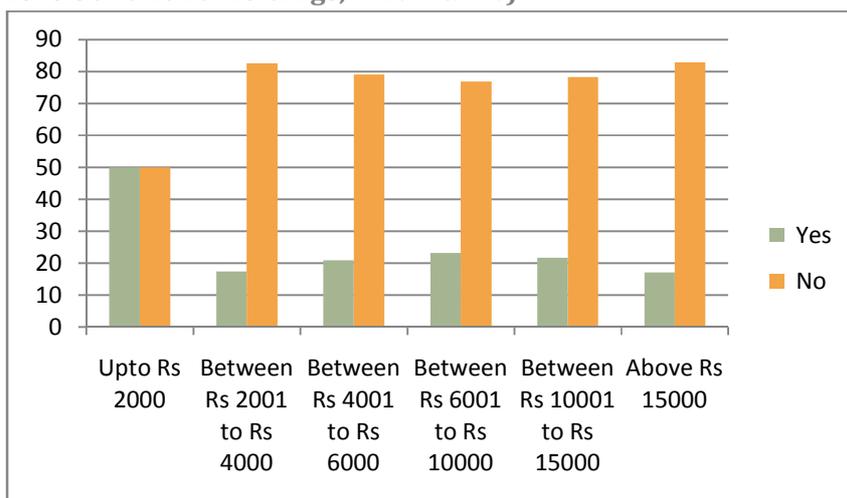
In what seems to be validating social networks theory of migration, households reporting a family member settled elsewhere for work, and households reportedly planning to migrate themselves, have relatively higher percentages of those who go out for work in certain seasons. The presence of family members in other cities and districts may reduce the risk and lower the cost of further migrations, both seasonal and longer-term, and thereby perpetuate them and even increase their volume.

Destinations for seasonal migrants reported in the survey also confirm this view. For instance, in Lower Thatta, of those reporting to have undertaken seasonal migration, close to 18% said they had gone to Karachi, which as we have seen earlier, is a major destination for labour migrants from that region. Upper Thatta has even a higher percentage (21%) of seasonal migrants reporting to have gone to Karachi. Across linguistic groups, Balochi or Barochki speaking respondents had the highest percentage of those reporting to have migrated to Karachi seasonally, which can be put down to a sizable population of Balochi speaking people in the mega city’s fishing sector. Similarly, Seraiki-speaking households also reported seasonal migration to Karachi, presumably drawing on the presence of fellow Seraiki speakers in Karachi’s informal economy<sup>40</sup>.

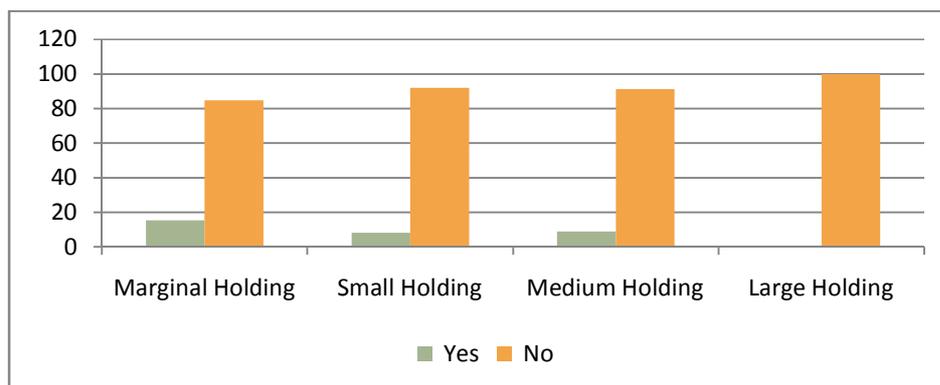
In Upper Badin, over 16% respondents reported to have gone to Hyderabad for seasonal work and 14% each to Karachi and Mirpurkhas. Seasonal migration in Lower-Central Badin appears to be concentrated within the district.

As can be seen in Charts 23 and 24, survey data reveals a clear link between poverty and propensity for seasonal work. The poorest of the poor and those with marginal land-holdings have significantly higher percentages of respondents saying they had gone out for seasonal work during the past two years.

**Chart 23 & 24: Households Reporting to have Migrated Seasonally (Percentage by Income Levels and Land Holdings; n=1614 & 440)**



<sup>40</sup> Survey data shows a similar pattern for Marwari and Punjabi speaking respondents, both having ethnic ties in Karachi.



### 3.8 Stories of Migrant Families

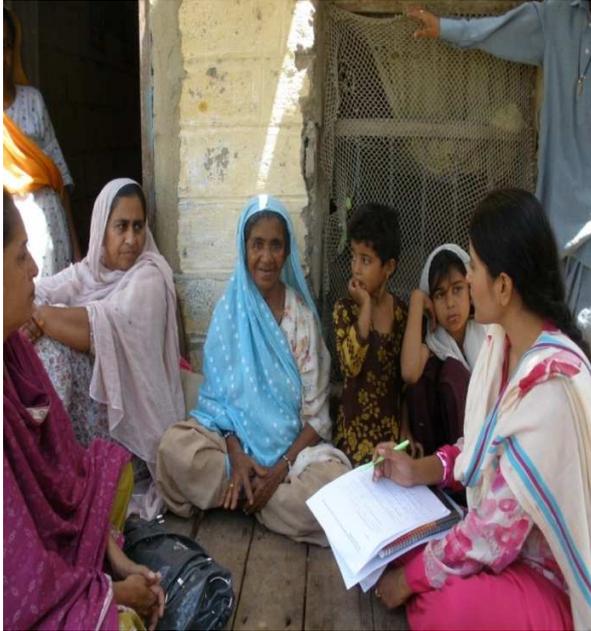
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Mindful of the fact that any migration experience involves complex issues and realities which no statistics can adequately describe, data collection for the present study included in-depth interviews with a small number of migrant families in Karachi and Hyderabad. Some of the narratives that emerge out of the interviews are presented below to capture the qualitative and subjective dimensions of the Indus Delta's recent migration story as experienced by men and women.

#### **Mai Baseera, 65, Ibrahim Hyderi, Karachi**

Forty years back, around 60 members of an extended family set sail for Karachi from Khobar Creek in *taluka* Keti Bundar, Thatta. Mai Bhagi vividly remembers the boat ride which took three days for them to arrive ashore in Karachi. She narrates her tale thus:

“My ancestors had lived in Keti Bundar for centuries. Fishing was their livelihood. When I was young, fresh water would come flowing in every six months. Local people would erect a reservoir to store that water to live off rest of the year. I don't remember exactly when the fresh water flow began to dwindle. We were hit by repeated floods. Fish catch got reduced and the farm land was



destroyed. Eventually, the village elders decided it was time to move off to Karachi. The men in our family had visited Karachi regularly to sell their catch. They had built a rapport with Mohammad Ibrahim, a notable influential in Ibrahim Hyderi village. He encouraged us to move in here. Once here, our lives were totally transformed. Back home, we women would weave fishing nets, fetch water and roam around the village freely. Here in Karachi, we got confined to our huts. Men took to fishing. Few months into our stay, Mohammad Ibrahim awarded us a piece of land to build a house on. My husband built us a one room house. Many women in my extended family are now into stitching and tailoring. This helps us make ends meet. I have grandsons now. Life goes on.

Things have changed even here in Ibrahim Hyderi. Drinking water is an issue. We have to purchase it from a supplier. My family has expanded but we are all crammed in a single room. Inflation hardly allows you to have two square meals. Bengali fishermen have virtually taken control of the area. This has also affected our fishing business. Despite poverty, we are educating our children. I remember my village often. I would be all too happy to go back there if only we could have access to drinking water”.

**Ibrahim Sheikh, 55-60 Years, Village Rehri, Karachi**

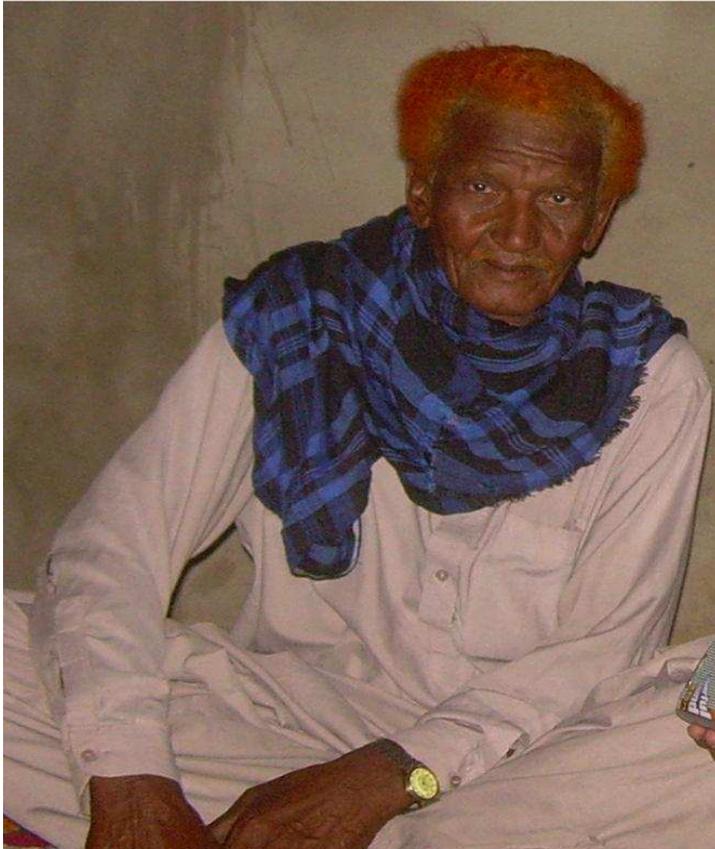
Sheikh migrated from village Takro Hashim, Keti Bundar, five years back bringing along 8 other family members, including 5 women and a child. His story follows:

“We were short of drinking water in our village. There was a time the river would flow in every three months. When its flow stopped, we dug a well, which provided sweet water. After a few years, it became brackish. Our livestock began to die. Lack of fresh water affected our catch, especially *palla*. *Biapari* (middlemen) would no longer give us a good price for our catch. Saline water burnt and killed off mangroves. Then came the cyclone, destroying many boats and houses. Many people fell ill. I spent a few years working as a labourer on daily wages but it was not enough to sustain a large family. Some relatives, who were already settled in Rehri, suggested that I move here. I finally rode my family here in my boat. The relatives helped us put up a hut. I started going fishing as soon as I arrived. The women began knitting nets. Life has not been easy in Rehri. We have to buy drinking water. Many outsiders have arrived. The coastline is dominated by them. We usually catch only small fish which do not fetch a good price. In our village, we did not have to worry much about food. We could grow our own vegetables at least. Here in Rehri, sewage is a big problem. We do not have electricity. Back in the village, people would go out of their way to help each other out in times of distress and happiness. Here, self interest comes first”.

**Mohab Qambrani, 65, Nasseem Nagar, Qasimabad-Hyderabad**

Erstwhile share-cropper hailing from village Mohammad Jat, *taluka* Badin, district Badin, Qambrani moved to Hyderabad with fifteen family members some 11 years back following the 1999 cyclone.

“We used to grow cotton, wheat, rice and tomatoes. Frequent floods and seawater intruding into our village left the land infertile. The soil became weak. Then a massive cyclone hit the area. We lost our homes and livestock and all our crops. We became indebted to the landlord. There was no source of livelihood except the land we worked.....”



We knew no one in Hyderabad so had to spend a night at the bus stop. Next day we found a deserted school and took shelter there. Hardly a few days had gone by when some government officials came and ordered us to vacate the school. We begged them to let us stay on till we found some work. Those days were the hardest I have ever seen. I work on daily wages now and women in my family have taken up paid domestic work. They are not comfortable working in strangers' homes but we have no option. We still have a debt to pay off. I have two sons who go to school. I do not want them to grow up to be daily wage earners like me. When I was young, we were pretty well-off. Seawater destroyed everything we had. There was a time when we went boat riding for fun. The area was covered with mangroves. They are all gone now. I would love to go back to my village someday”.

**Masi Sallo, Naseem Nagar, Qasimabad, Hyderabad**

Originally from village Ach Shareef, *taluka* Talhar, district Badin, Masi Sallo came to Hyderabad some fifteen years back.

“Back in Badin, men in our family would go fishing. We, women, would spend much of our time stitching clothes. We were fortunate to have sweet water in our village, which was very rare in the area. We were living a good life. Things took an unexpected turn when the cyclone hit and heavy rains came pouring down. Our village was submerged in water for many days. Standing crops and cattle got washed away. We took off for Hyderabad as we had some relatives living here. Initially, we thought we would stay here for a few days, but decided to stay on as there was nothing left back in the village. Most of our relatives migrated to Hyderabad. I do not think we will ever go back. I hear there is no water for the crops or to drink. If we go back, we might die of hunger. Here, we have to work hard but at least we are able to feed ourselves”.

## 4. ISSUES IN FISHING

### 4.1 Boat Ownership

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Just around 16% households engaged in fishing, or both fishing and agriculture, reported to have a boat of their own. The percentage was higher in Badin compared to Thatta. Those who reportedly owned a boat belonged mostly to Khashkheli caste. Within the predominantly fishing community called Mallah, about 36% said they owned a boat.

Survey data suggests that owning a boat may have a positive impact on earnings. Conversely, it may be argued that greater income allows households engaged in fishing to afford to buy a boat. As Table 22 shows, boat ownership increases as we move up through income categories.

**Table 22: Boat Ownership by Income Levels**

Household Monthly income	Do you or a household member own a boat?		Total
	Yes	No	
Up to Rs 2000		100.0	100.0
Between Rs 2001 to Rs 4000	13.3	86.7	100.0
Between Rs 4001 to Rs 6000	15.4	84.6	100.0
Between Rs 6001 to Rs 10000	23.5	76.5	100.0
Total	15.6	84.4	100.0

n=64

To weave the findings on migration into our discussion, it would be pertinent to note that within the households who do not own a boat, over 10% have a family member settled for work elsewhere. Among those who said they owned a boat, no respondent reported a family member working away from home. There also appears to be a co-relation, although a weak one in statistical terms, with boat ownership and propensity to migrate. Of those who did not own a boat, 46 % said they were thinking of migrating themselves or were “not sure” if they would migrate. Among those who owned a boat, a lower percentage (40%) respondents, said they were thinking of migrating and 60% said they were not.

### 4.2 Operating Arrangements

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The contract system, which allowed auctioning rights to business men, has largely come to an end. Most fisher folk report working on a share basis, or independently with or without a license. Those who still report to be working under a contractual arrangement make up less than 5% and come entirely from district Thatta. Also, all those who said “a contract best described their work as a fishing family” happened to be women and may not have precise information on the way male

family members are actually operating. The inference is drawn from the fact that the percentage of female respondents who said they did not know about the operating arrangements was more than double their male counterparts. It would be equally plausible to assume that existing working arrangements may also have exploitative elements leading the respondents to equate them with the infamous contract system.

The percentage of those reporting to be operating independently without a license is exceedingly higher in district Badin compared to Thatta. This may be attributed to the fact that Badin was in the limelight because of Pakistan Rangers controlling fishing at Zero Point. The district may have seen a more swift eradication of the contract system and leniency from the authorities regarding the requirement of having a license. The findings may tempt one to think that most fisher folk in Badin operate on a subsistence level. However, as we are going to see shortly, a high percentage of respondents even in that district are apparently bound to sell their catch to a middle man. This is not denying the fact Thatta allows greater commercial opportunities to fisher folk because of a more well-established intermediary market, which eventually supplies catch to Karachi Fish Harbour. As such, conditions are more conducive in Thatta for people to operate on larger commercial boats on a share basis.

**Table 23: Operational Arrangements for Fishing by Districts**

What arrangement best describes your work as a fishing family?	District		Total
	Thatta	Badin	
On license	18.6	10.0	17.0
On contract basis	4.7		3.8
On monthly wages	7.0	10.0	7.5
Independently without license	9.3	70.0	20.8
On a share in catch	32.6	10.0	28.3
Do not know	27.9		22.6
Total	100.0	100.0	100.0

n=64

Close to 70% respondents engaged in fishing said they were bound to sell their catch entirely or in part to someone. The percentage was higher for Thatta at 72% compared to 60% for Badin. Over 26% said they had to sell catch to the boat-owner and 69% said the agent or middleman. The highest percentage of those saying they were bound to sell catch to the boat-owner came from union council Uddasi, *taluka* Ghorabari in Thatta, and the highest percentage of those saying they had to sell catch to a middleman from union council Kharo Chan, again in Thatta. Percentage of those saying they were bound to sell catch was higher (80%) among households who did not have a family member settled elsewhere for work compared to the corresponding figure of 40% for those who had a family member settled elsewhere. It can be assumed that bondage to a middle man or a buyer might serve as a disincentive to migrate or a barrier to mobility.

### 4.3 Perceived Changes in Fish Catch & Mangroves Cover

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Asked what changes they had seen in fish catch for the past few years, an overwhelming majority of respondents associated with fishing said “the catch had decreased”. Less than 6% said they had seen “no change” or that “the catch had increased”.

**Table 24: Perceived Changes in Fish Catch**

Changes observed in fish catch	Percent
Catch has increased	1.9
Catch has decreased	94.3
Has been no change	3.8

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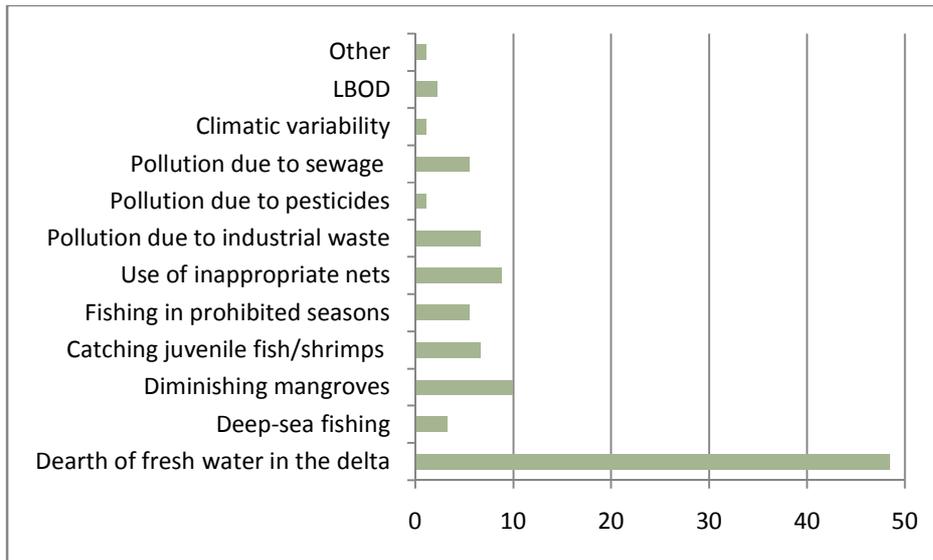
n=64

Asked for how long had this problem existed, some 36% said for the past five years or less and 22% said 6-10 years. Over 40% of those who said the catch had decreased did not know when the problem actually began. The finding underscores the need for a dialogue between experts and fisher folk to bridge the gap between scientific knowledge and local perceptions.

On the reasons for the decline in fish catch, the most frequently cited reason was “dearth of fresh water flowing into the delta”. Besides other causes, “diminishing mangroves” was mentioned by about 10% respondents as a reason for decline in fish catch. Other frequently cited causes were “use of inappropriate nets”, “catching juvenile fish and shrimps”, “industrial waste” and “sewage”. The percentage of those saying the fish had decreased because of lack of fresh water was double (49%) in Thatta, compared to the corresponding percentage in Badin. The difference is understandable considering the fact that the Indus flowed into the delta on the Thatta coast, where the impact of changes in environmental flows would be more obvious. By contrast, comparatively higher percentages of respondents in district Badin mentioned “industrial waste”, “sewage” and “agricultural waste”, as reasons for a decline in catch.

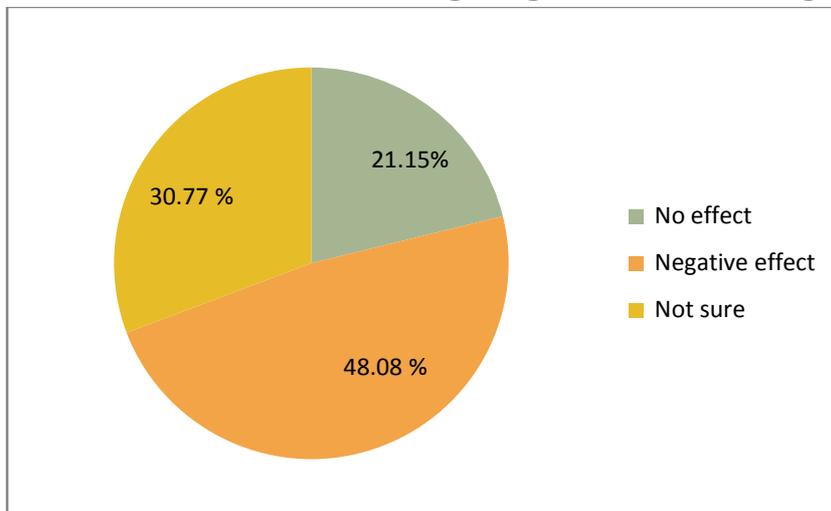
A few respondents specifically mentioned LBOD as a cause for declining catch, which dumps contaminated water into the Arabian Sea in union council Ahmed Rajo, district Badin. Respondents from Upper Thatta and Upper Badin, presumably practicing in-land fishing, mentioned lack of fresh water as the only cause for declining catch. Climatic variability was mentioned as a reason by a very small percentage, all in the youngest age-cohort of 18-24 years.

**Chart 25: Reasons Fish Catch has Reduced as Perceived by Fisher Folk (n=64)**



Data on perceived connection between decline in fish catch and the mangroves suggest a partially ambivalent attitude. While 48% respondents said the decline in mangroves cover had had a negative effect on fisher folk, slightly over 21% cent said it had had no effect and close to 31% said they were “not sure”. Greater percentages of women than men said diminishing mangroves had had no effect on fishing communities and that they were not sure<sup>41</sup>.

**C 26: What Effect have Diminishing Mangroves Had on Fishing Community? (n=64)**

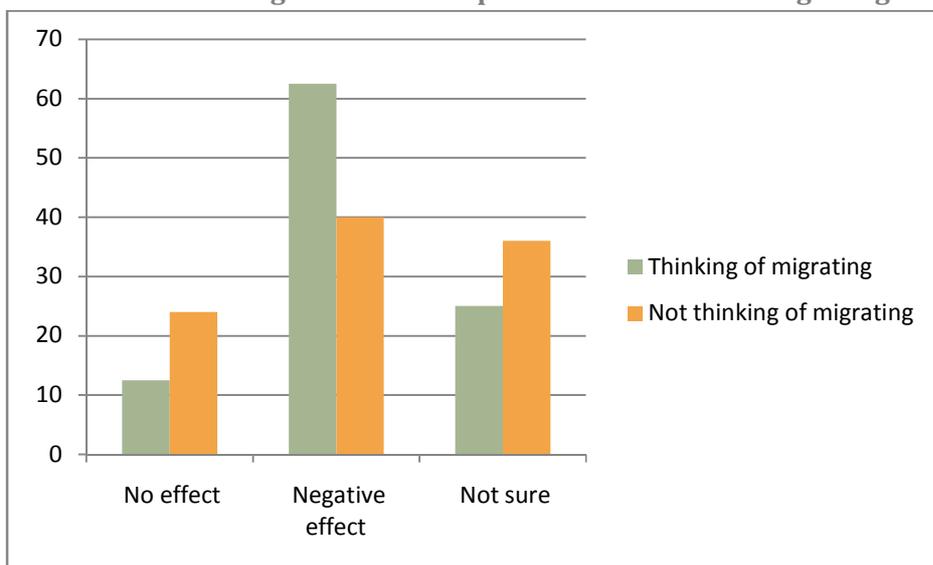


<sup>41</sup> Among women, 28 % said it had had no effect on fishing communities compared to 18 % among men. Over 33 % of women said they were not sure whether diminishing mangroves had had any effect compared to 29 % men.

Those in the lowest income bracket and those owning livestock had higher percentages of respondents saying reduced mangrove cover had had a negative effect on the fishing community. Perceptions within these groups might be informed by their traditional reliance on mangroves for fodder and fuel.

To reconnect the debate with migration, among those in the fishing community who said they were thinking of migrating themselves, 62% said reduction in mangroves was having negative effects compared to the corresponding percentage of 40% among those who were not thinking of migrating. The decision to migrate, then, may itself be a result of a more acute understanding and firsthand experience of shrinking natural resource base.

**C 27: Intention to Migrate and Perceptions about Diminishing Mangroves (n=39)**



#### 4.4 Debt Patterns and Sources of Credit

More than 50% respondents engaged in fishing said they needed to borrow money “frequently” and another 26% said “sometimes”. All respondents belonging to the Mallah caste and 80% from the Mirbhar caste said they had to borrow money frequently. As Table 25 shows, no female respondent said they “never” needed to borrow money. The difference may well have to do with reluctance among some men to admit they have to borrow. Even when taken at face value, the findings point to a widespread trend of accumulating debts within the fishing community.

**Table 25: How frequently do you find yourself in need of borrowing money? (Percentage by Gender)**

Respondent in need of borrowing money						
Gender	Frequently	Sometimes	Rarely	Never	Cannot say	Total
Male	57.1	17.1	2.9	11.4	11.4	100.0
Female	50.0	40.9			9.1	100.0
	54.4	26.3	1.8	7.0	10.5	100.0

n=64

The tendency to borrow money is not confined to lower income groups. Those in the highest income quintiles had over 50 % respondents saying they needed to borrow money frequently. As interviews with key informants and local fishermen revealed, seed money required to buy fishing resources and maintaining cash flow during lean periods leaves many perpetually in debt.

Greater percentages of bigger households (11 or more members) reportedly need to borrow money than the smaller ones. Over 25% households belonging to smallest households (5 or less members) and 14% among those having 6-10 members said they never needed to borrow. There were no respondents among bigger households saying that. This holds true for the quantum of debts too: all respondents reporting debts in access to Rs. 70,000 belonged to households with 11 or more members.

**Chart 28: Borrowing Needs and Family Size (n=49)**



The amounts of borrowed money range from less than Rs. 5000 to over Rs. 150,000. Close to 14% each said they own sums in the ranges Rs. 5001-Rs.10,000, Rs. 10001 to Rs. 20,000 and Rs. 20,001 to Rs. 40,000. Over 11 % had debts amounting to over Rs. 150,000.

The most common source of credit is the middlemen or agent mentioned by close to 60% respondent. Around 26% said they borrow money from the boat owner and 9% said from friends of relatives. District Thatta had 31% respondents saying they borrowed money from the boat-owner. In Badin by contrast, all respondents mentioned middle man or agent as the main source of credit.

**Table 26: Main Source of Credit Reported**

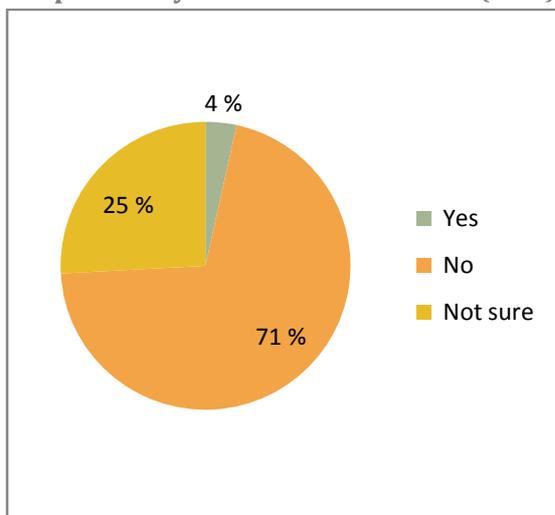
Main Source of Credit	Percent
Middleman or agent	58.7
Boat owner	26.1
Friends or relatives	8.7
Cannot say	2.2
Other	4.3
Total	100.0

n=49

#### 4.5 Awareness of Climate Change & Disaster Preparedness

Asked if any government official had given them information about adapting fishing methods to changing climate, close to 71% said “no” and over 26% were “not sure”. The high percentage of respondents saying they were “not sure” may have to do with a lack of understanding of the term climatic changes. Clearly, however, the level of information-sharing between government officials and the local fisher folk is very low. A similar question asking about the NGO officials contacting the fisher folk to discuss the issue elicited a negative reply from a vast majority (79%). The rest said they were “not sure”.

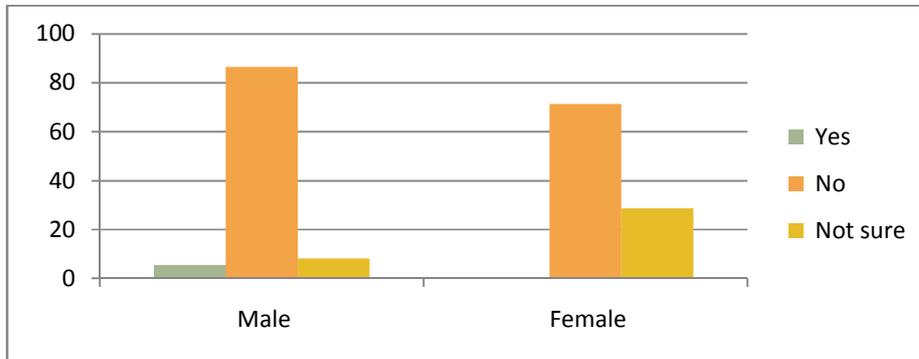
**Chart 29: Percentage of Respondents who have Received Information on Climate Change Adaptation by Government Officials (n=64)**



In both cases, not a single female respondent said they had been contacted by an official (government or non-governmental) in connection with adapting fishing practices to changing climate. Male respondents saying an NGO official had talked to them about fishing practices in the

context of climatic change, mostly came from Keti Bundar, and to a lower extent from Kharo Chan, both in Lower Thatta with some NGO presence.

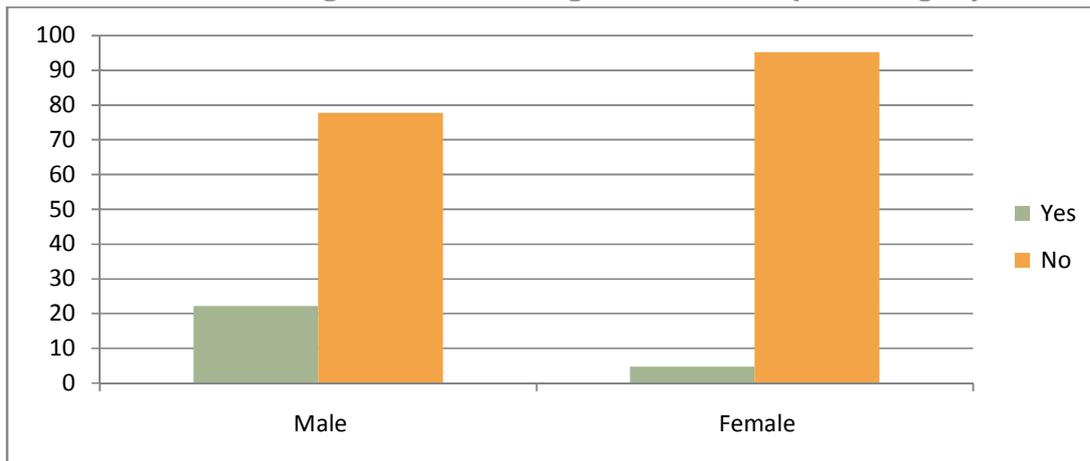
**Chart 30: Percentage of Men and Women who have Received Information on Climate Change Adaptation by Government Officials (n=64)**



In what makes for a disconcerting juxtaposition with the disaster-prone history of the region, especially the coastal belt, close to 80% respondents said their family did not have information on how to prepare to cope with floods and storms. The remaining 20% said they were “not sure”. An even higher percentage of respondents (90%) said they had not participated in any meeting related to disaster preparedness during the past two years. The rest said they were “not sure”<sup>42</sup>. The findings belie claims by official agencies and their funding partners regarding community participation in disaster management planning.

To a broader question simply inquiring if the respondent knew of any organisation working for the welfare of fisher folk, some 16% said “yes”. However, the percentage of women saying they were aware of such an organisation, was five times lower than the corresponding percentage for men.

**C31: Awareness of an Organisation Working for Fisher Folk (Percentage by Gender; n=64)**



<sup>42</sup> There was only one village, Haji Yousuf Katiyar, where three respondents, all men, said they had participated in such a meeting.

All those who said they knew of an organisation working for the fishing community, mentioned the Pakistan Fisher Folk Forum.

## 5. ISSUES IN AGRICULTURE

### 5.1 Water Availability, Salinity and Sea Intrusion

The importance of fresh water flows to the Indus Delta comes into sharp relief when we look at the sources of irrigation for the agricultural communities. Almost 99% of respondents engaged in agriculture report the main source of irrigation for their crops to be canal water. “Canal and tube well” is cited as a source by close to 5% respondents having medium size holdings. The figure adds up to just about 1% of the total agricultural households<sup>43</sup>. Union council Jhampir, which had borne the brunt of a drought in 2005, was the only UC where respondents reported rains as the main source of irrigation.

**Table 27: Source of Irrigation by Size of Land Holdings (Percentage)**

	Source of Irrigation		Total
	Canal	Canal and tube well	
Marginal Holding	100.0		100.0
Small Holding	99.2	.8	100.0
Medium Holding	95.2	4.8	100.0
Large Holding	100.0		100.0
Total	98.8	1.2	100.0

n=440

Asked what changes they had seen in the availability of water for their crops in recent years, close to 93% said there had been a “significant decline”, and another 6% said there had been “some decline”. The percentage of those saying there had been a significant decline in the availability of water for irrigation was higher in district Badin compared to Thatta. In three union councils of Upper Badin and in union council Kinjhar in Upper Thatta, 100% respondents said they had seen a “significant decline” in water available to irrigate the crops.

Around 52% respondents in the two districts said they had lost land to salinity or seawater intrusion, with the highest percentage (79%) in Lower Thatta and around 41% each in the remaining three clusters. Of those saying they had lost land, about 50% respondents did not know exactly how many acres had been lost. Of the remaining, 34% said they had lost 1-5 acres and 9% said they had lost 6-10 acres. Greater percentages within large land holders and medium land holders, compared to small and marginal ones, said they had lost some land to salinity or seawater.

<sup>43</sup> Respondents reporting to use canal water as well as a tube well, came from union councils Uddasi and Chach in Lower Thatta.

**Table 28: Households Reporting Loss of Land to Salinity or Seawater**

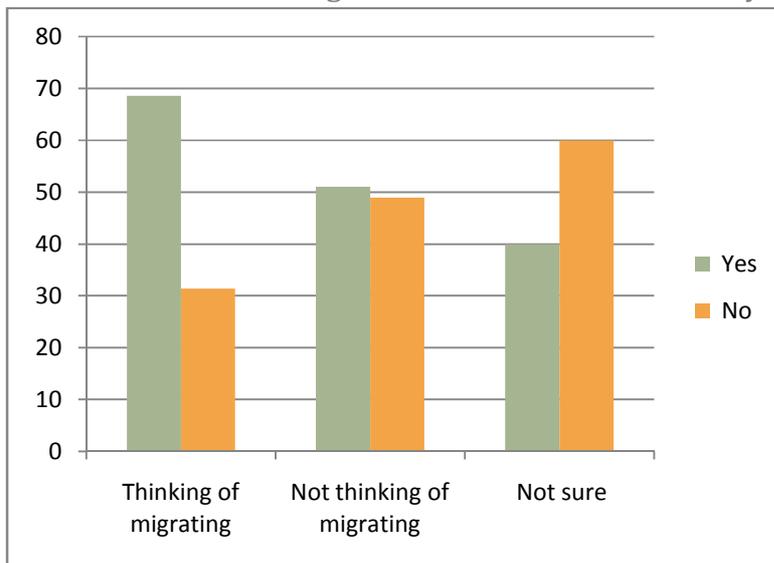
Loss of Land in Acres	Percent
1 to 5 Acres	33.9
6 to 10 Acres	9.2
11 to 15 Acres	1.9
16 and above Acres	3.4
Do not Know	51.5
Total	100.0

Total

n=905

In what looks like an evidence of the link between climatic change, environmental degradation and migration, percentage of those who reported to have lost some agricultural land to salinity or seawater intrusion was higher within the respondents who said they were thinking of migrating compared to those who were not thinking of migrating.

**Chart 32: Intention to Migrate and Loss of Land to Salinity or Seawater**



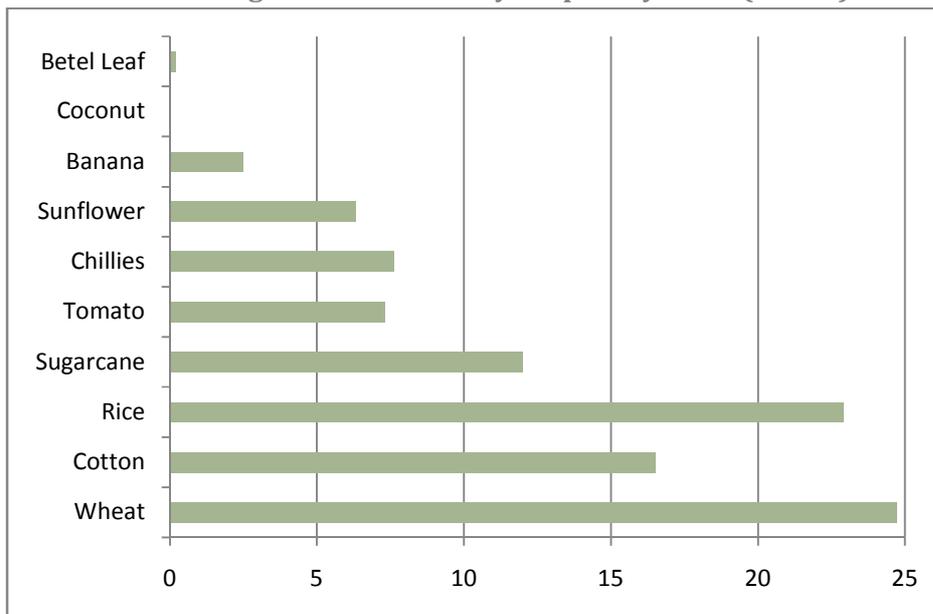
## 5.2 Crop Patterns and Perceived Changes in Yield

Close to 24% respondents engaged in agriculture said they grew wheat. Rice comes a close second at 22%, followed by cotton at 17%, and sugarcane at 13%. Compared with the data available in the Agricultural Census 2000, survey findings reveal probable changes in crop patterns, with decline in some and increase in others.

By districts, 27% in Badin reported growing wheat, 24% cotton, 13% sugarcane and 24% rice. Compared with the data available in the Agricultural Census (2000), it appears there has been a significant increase (18%) in farms growing cotton and a decline of about 6% in farms growing wheat. Survey data reveals a decline in the percentage of farms producing sugarcane as well, which previously stood at around 35%. The most phenomenal decrease, it seems, has occurred in the percentage of farms growing rice, which in the 2000 Census stood at 67% of all farms.

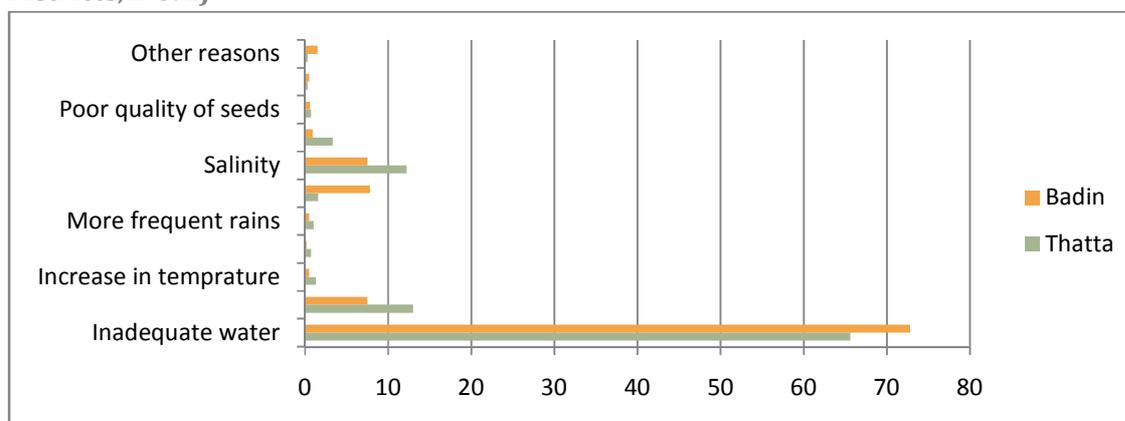
In Thatta, 22% respondents reported growing wheat, 9% cotton, 22% rice, and 11% sugarcane. While the percentage of farms growing wheat has just about remained the same, there has been a decline in sugarcane, which was reportedly grown by 17 % farms in Thatta in the year 2000. Percentage of farms cultivating cotton again seems to have increased substantially from the previously reported figure of 2%. There has been a major decline in the farms producing rice in the total mix as the percentage of farms growing rice was as high as 79% in the Agricultural Census 2000. It would be safe to assume that the cultivation of cotton has increased, and that of sugarcane and rice has gone down substantially in both districts. The latter two being water intensive crops, might no longer be a feasible option for many farmers.

**Chart 33: Percentage of Households by Crops they Grow (n=890)**



Asked which crops had seen a decline in yield in recent years, 18% respondents in Lower Thatta mentioned rice, a figure higher than other clusters. Close to 16% respondents in Lower Badin and 15% in Upper Badin said they had observed a decline in the yield of sugarcane, compared to 11% each in Upper and Lower Thatta. The percentage of those reporting a decline in the yield of wheat in Badin was almost double the corresponding percentage for Thatta. With regard to the reasons for declining yield, a greater percentage of respondents in Badin compared to Thatta mentioned “inadequate water”, with a very high percentage in Lower-Central Badin. Brackish water and salinity were cited as reasons more frequently in Thatta compared to Badin. Over 12% respondents in Upper Badin mentioned less frequent rains as a reason.

**Chart 34: Perceived Reasons for Decline in Crop Yields (Percentage of Respondents by Districts; n=891)**



### 5.3 Adaptation Knowledge and Experience

Changing crop patterns described above provide an evidence of farmers making some level of adjustments because of water stress and other factors. Asked more specifically as to whether they had tried changing farming practices over the past 8 years because of climatic changes, over 52% respondents replied in affirmative. At 86%, Lower-Central Badin had the highest percentage of those saying they had tried changing farming practices. Seen in conjunction with data on crop patterns, it appears that many of them would have shifted away from sugarcane and rice to cotton and other crops.

**Table 29: Respondents who have Attempted to Change Farming Practices (Percentage)**

		Respondent has tried to change farming practices in the past 8 years or so because of changes in climate			
		Yes	No	Not sure	Total
Cluster Name	Lower Thatta	30.8	56.5	12.7	100.0
	Upper Thatta	32.7	54.7	12.6	100.0
	Lower Central Badin	86.2	4.5	9.3	100.0
	Upper Badin	54.2	42.6	3.2	100.0
Total		52.5	38.4	9.2	100.0

n=917

Of those reporting a change in farming practices, just about 9% said they had been “successful” or “most successful” in adapting to changing climate, most of them large land-holders. Over 21% said they had been “unsuccessful” or “most unsuccessful” and the rest were “not sure”. Lower Thatta had the highest percentage of those saying they had been “unsuccessful”. Some key informants reported that people originally associated with agriculture have shifted to fishing over the past

years and a couple of decades; it would be plausible to assume that many of them might have tried changing farming practices before giving up and switching to another livelihood.

With regard to adaptation, respondents were also asked if they were aware of “drought resistant crop varieties”, to which close to 47% said they were “aware” or “well aware”. The percentage of those saying they were aware was higher in Upper Thatta and Upper Badin.

**Table 30: Self-reported Awareness of Drought Resistant Crop Varieties (Percentage)**

Cluster	Respondent is aware of drought resistant crop varieties			Total
	Well Aware	Aware	Not Aware	
Lower Thatta	14.9	43.3	41.8	100.0
Upper Thatta	23.9	32.1	44.0	100.0
Lower Central Badin		19.7	80.3	100.0
Upper Badin	.4	54.4	45.2	100.0
Total	8.5	38.1	53.4	100.0

n=916

There were no significant difference seen regarding the self-reported level of awareness of drought resistant crop varieties between those who had lost assets as a result of drought and those who had not. In Union Council Jhimpir in *taluka* Thatta, 80% respondents said they were “not aware”. The percentage of those saying they were not aware was higher among those who owned no land compared to those who were land-owning farmers.

The reported level of interaction and information sharing by government officials to help farmers adapt farming practices to changing climate again shows a dismal picture as well as variations across gender and types of land holdings. Overall, just 1% of respondents, most of them men, said they had received information from a government official. Within land holding categories, it is only large farmers who make up some percentage of those reporting to have been contacted by a government official with regard to adaption.

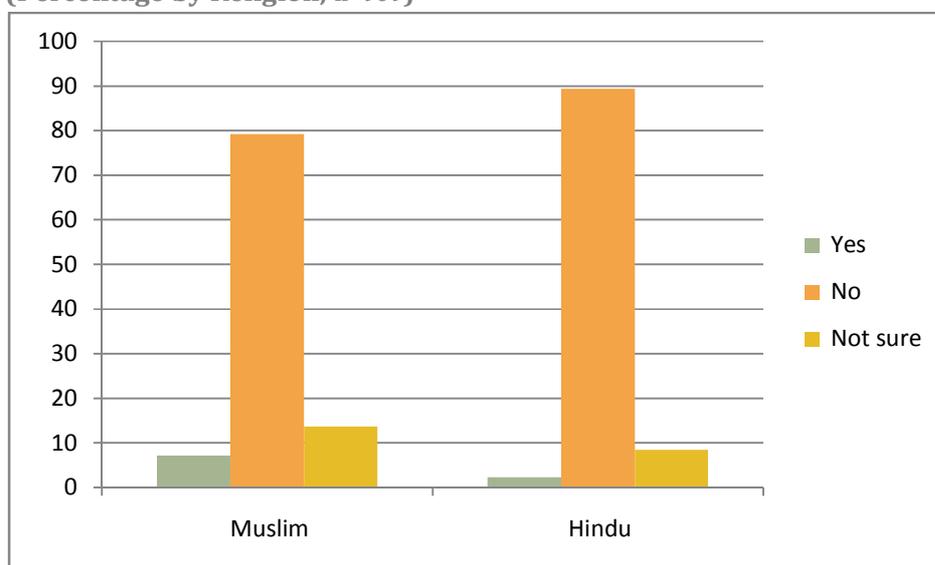
**Table 31: Percentage of Respondents who Have Received Information on Adaptation from Government Officials**

Have you received information on adapting farming practices to changing climate from a government official during the past one year?				
Landholding Categories	Yes	No	Not sure	Total
Marginal Holding	1.0	85.3	13.6	100.0
Small Holding	1.5	86.3	12.2	100.0
Medium Holding		82.9	17.1	100.0
Large Holding	10.0	80.0	10.0	100.0
Total	1.2	85.0	13.8	100.0

n=440

Response pattern to a similar question regarding NGOs was slightly more positive. Overall, 6.5% respondents-compared to 1% in the case of government officials-said an NGO worker had provided them information regarding adaptation in the context of climatic changes. At around 12%, the percentage was higher for Thatta district compared to Badin. The percentage of those saying they had received information was about three times lower (2%) among minority Hindu community compared to majority Muslims (7%).

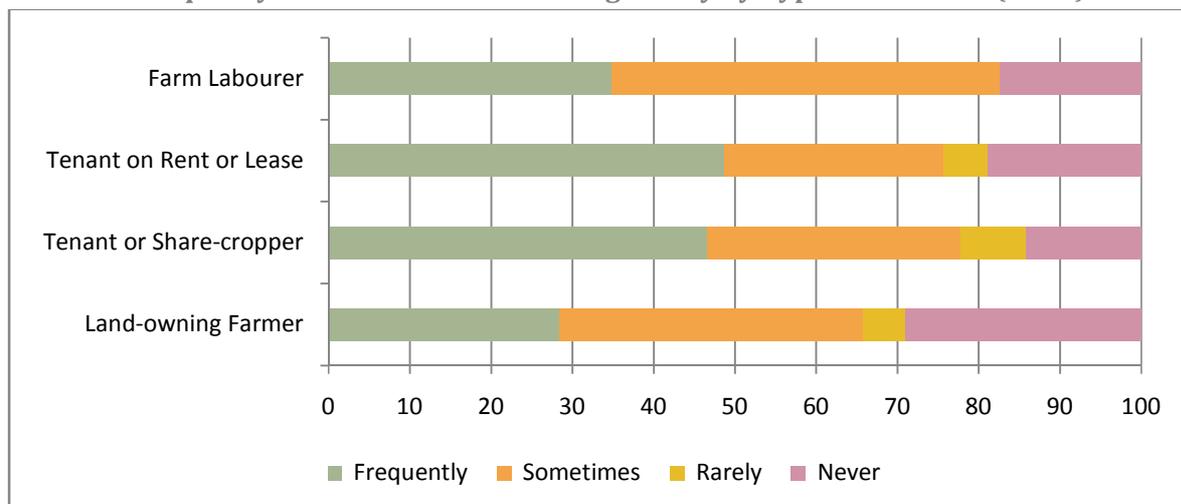
**Chart 35: Respondents Reporting to have Received Information on Adaptation from an NGO (Percentage by Religion; n=909)**



## 5.4 Debt Pattern and Sources of Credit

Asked how often they find themselves in need of borrowing money, around 29% respondents associated with agriculture said “frequently”, and another 40% said “sometimes”. The figure is lower than that found in the fishing communities, but merits attention because of some revealing variations across types of farmers. As can be seen in Chart 36, tenants on rent or lease and share croppers had higher percentages of those saying they needed to borrow money frequently compared to farm labourers and land-owning farmers. Dependence on credit can thus be seen as a function of landlessness.

**Chart 36: Frequency of the Need for Borrowing Money by Types of Farmers (n=923)**



The percentage of those reporting to be in need of borrowing “frequently” and “sometimes” was higher in Lower-Central Badin and Lower Thatta compared to the other two clusters. In what might be indicative of long-standing cultural practices as well as high levels of poverty, minority Hindus had greater percentages of respondents saying they needed to borrow frequently.

The most common source of credit in both districts is the “landlord” mentioned by 43%. Other sources include professional money lenders (20%), friends and relatives (12%), government institutions (8%), middle men (7%) and shopkeepers (5%). Only 1% respondents mentioned NGOs as a source of credit. The percentage of those identifying middlemen and professional money lenders as a main source of financial credit is noticeably higher in district Thatta compared to Badin. Reliance on landlords is more widespread among religious minorities. It is pertinent to note that no non-Muslim respondent reported a government institution as a source of credit.

**Table 32: Main Source of Credit for Muslims and Non-Muslims**

Main Source of Financial Credit	Religion		Total
	Muslim	Hindu	
Landlord	32.6	88.5	43.2
Middleman	8.4	1.6	7.1
Professional moneylender	23.7	6.6	20.4
Friends or relatives	14.1	1.6	11.8
Government institutions	10.1		8.2
Private bank	3.1		2.5
Other	1.1	.8	1.1
Shopkeeper	5.7	.8	4.8
NGO	1.1		.9
Total	100.0	100.0	100.0

n=646

Equally noteworthy is the fact that there is a co-relation between the size of land-holdings and access to financial credit through an institutional source. Those with large land holdings had 33% respondent mentioning “government institutions” as the main source of financial credit; the corresponding percentage was 19% for medium land holders, 13% for small holders and less than 10% for marginal land holders.

On the quantum of debt, over 55% respondents reported it to be up to Rs. 40,000. As could be expected, large landholders owe larger debts i.e. to the tune of over Rs. 100,000 and 150,000. However, even within marginal land-holders there are some respondents reporting to owe high debts.

**Table 33: Amounts of Debt Owed By Size of Land Holdings**

	Landholding Categories				Total
	Marginal Holding	Small Holding	Medium Holding	Large Holding	
Up to Rs 5000	6.5	5.3	8.8		6.5
Between 5,001 to 10,000	22.1	15.8	8.8		17.0
Between 10,001 to 20,000	31.2	15.8	2.9		20.3
Between 20,001 to 40,000	13.0	18.4	11.8		13.7
Between 40,001 to 70,000	15.6	13.2	23.5		16.3
Between 70,001 to 100,000	7.8	21.1	14.7		12.4
Between 100,001 to 150,000	1.3		2.9	25.0	2.0
150,001 and above	2.6	10.5	26.5	75.0	11.8
Total	100.0	100.0	100.0	100.0	100.0

n=440

To round off the narrative on debt patterns, it would be interesting to note that among respondents who do not have a family member settled elsewhere for work, around 18% respondents reported to be in debt amounting to over Rs. 70,000. By contrast, those reporting to have a family member settled elsewhere for work, no respondent reported debts exceeding Rs. 70,000. A similar pattern is seen when we look at debts reported by those who are thinking of migration and those who are not. The latter have greater percentages reporting debts over Rs. 70,000 and Rs. 100,000. What the data points to is that migration is not undertaken as a debt payment strategy. If any thing, it seems that being in debt serves as a disincentive to migrate: the household may be short of upstart capital needed to finance migration or may have obligations to the lender-in most cases the landlord-which ties them down to the land.

## 5.5 Organisational Memberships

Membership in farmers' associations and cooperatives is almost negligible. Just about 2% respondents said they or a family member of theirs was a member of an association or a cooperative. At 5%, Lower Thatta had the highest percentage of respondents reporting some kind of membership. However, among large land holders, a significant 18% said they were members of an association or a cooperative. In most cases, they are associated with Abadkar Associations, government formed cooperatives ostensibly aimed at providing a collective forum to farmers. In practice, as the survey data confirms, the associations are dominated by large land owners.

**Table 34: Households Reporting Membership of a Cooperative or a Farmers' Association by Size of Land Holdings**

Landholding Categories	Is the respondent or any family member associated with a cooperative or a farmers' association?			Total
	Yes	No	Not sure	
Marginal Holding	4.2	93.2	2.6	100.0
Small Holding	2.3	95.5	2.3	100.0
Medium Holding	4.8	94.0	1.2	100.0
Large Holding	18.2	81.8		100.0
Total	4.1	93.8	2.2	100.0

N=440

There appears to be some degree of co-relation between education levels and membership of an association or a cooperative. Among the respondents reporting their education level to be Masters, over 27% said they or a family member was associated with a cooperative or a farmers' association. The corresponding figure was less than 2% for those reporting their education status to be primary or below primary. Along with the size of land owned, level of education attained may have some influence on whether a farmer gets to be a part of a cooperative or an association. On the issue of memberships, one final point relates to religious minorities. As we saw in the case of access to institutional sources of credit, membership in cooperatives and farmers' associations, howsoever limited, is again confined to Muslims. No non-Muslim respondent reported membership of any association or a cooperative.

A related question aimed at gauging awareness of non-governmental or community organisations among agricultural communities elicited a largely negative response. Close to 97% respondents said they were not aware of an NGO or a community organisation working to support agricultural communities in their area. The highest percentage of those saying they were aware again came from Lower Thatta, which appears to have a concentration of NGOs and INGOs within the Indus Delta. Across types of land-holdings, those owning large lands had 18% respondents saying they were aware of an NGO or a community organisation working in their area for agricultural communities. The corresponding figures for marginal and small land holders were 6% and 4% respectively. In continuation of a pattern we have already seen, no respondent belonging to a religious minority said they were aware of an organisation.

## 6. RECOMMENDATIONS

Against the backdrop of the primary data analysis, we finally present a set of recommendations for policy makers, funding agencies, local and international NGOs dealing with migration, water issues and fishing and agricultural sectors. The suggestions made in the earlier part of the report with regard to reconceptualizing environment and natural resources beyond narrow economic, monetary and market-oriented terms, can hardly be over-emphasized. Bringing a nuanced perspective to bear on migration as a dynamic process taking place within existing social and economic resources and barriers is equally important.

### 6.1 Migration

---

- Prepare a Migration Policy to cover both internal and external migration and looking at existing patterns and potential routes and destinations of migration in years to come. The policy would need to outline measures to minimize social costs involved in migration and providing support to family members left behind. Address existing conflicts over natural resources especially those organized around ethnic lines to preempt larger conflicts to emerge in future.
- Expand the definition of in-migration to include population movements within districts in the National Census. Incorporate data on migration out of a district in the census and not just in-migration.
- Involve migrant families and individuals, for example those from the Indus Delta now residing in Karachi, in development initiatives in their areas of origin. That kind of support could take the form of marketing linkages with migrants helping fisher folks and farmers connect with urban businesses and traders.
- Establish support units for families of migrants left behind, providing advice and incentives for savings, children's health and education, and psycho-social support.
- Explore options for re-settling marginal land holders, who are no longer able to eke out a living in the Indus Delta, around peri-urban agricultural land elsewhere in the province.

### 6.2 Water Issues

---

- Publicize the findings of the Independent Panel of Experts (IPOP) report on environmental flows downstream Kotri and have an open dialogue involving representatives of the delta communities.
- Address issues of inefficient and inequitable use of agricultural water and invest in the development of the Indus Delta and protection of threatened ecosystems before proposing new large dams.
- Incorporate calculation of water footprints into decision making in agriculture and water sectors with a view to better priority-setting and resource allocation.

- Initiate behavior change campaigns in urban areas to encourage recycling and reuse of water and a reduction in water consumption. Water Footprint calculation of various consumer products could be used as a tool in such campaigns.
- Address contamination of water aquifers in the Indus Delta and elsewhere. Regularly monitor the quality of surface and groundwater in the Indus Delta.
- Make immediate arrangements for supplying drinking water to coastal areas in the delta, keeping in view the prospect of increasing numbers of families migrating out to Karachi.

### 6.3 Fishing

---

- Develop a Sustainable Fisheries Policy building on the draft prepared by the Pakistan Fisher Folk Forum. Treat fisher folk as a separate and distinct occupational category in the National Census, the Labour Force Survey and policy documents such as National Employment Policy and Labour Policy.
- In the light of co-relation between boat ownership and income levels, provide easy loans to the fishing community for buying and building boats.
- Initiate a dialogue with middle men to check exploitative practices. Environmental and climatic change issues could provide a safe entry point to kick start such a process and gradually reform credit and profit-sharing arrangements. In the long run, provide institutional credit, a secure access to the market, and insurance against lean periods and natural disasters, to fishing community. Advocate with micro finance banks to extend services to fishing communities.
- Ensure the implementation of existing legislation to check dumping of industrial waste into the Arabian Sea.
- Develop non-farm rural sector to help fisher folk diversify livelihoods in the context of possible reduction in fish catch as a result of climatic change and inadequate environmental flows into the delta.
- Enhance the role of the District Fisheries Department in terms of greater information sharing on weather and climatic variability and sustainable fishing methods.
- Remove the misgivings between “local” fisher folk and Bangladeshi immigrants working on the Karachi coast. Communicate with opinion makers and the public at large regarding the rights of Bangladeshis as eco-migrants. Drawing out parallels between the situation of Bangladeshis in Pakistan and that of Pakistani workers in the Gulf could help drive home a more humane and nuanced perspective on the issue of “irregular migrants”.

### 6.4 Agriculture

---

- Provide implements and tools for land-leveling, drip and sprinkle irrigation, especially to marginal and small land-holders to facilitate adaptation to water scarcity.

- Work to build a consensus on phasing out water intensive crops, including rice and sugarcane. Water Footprint Accounting could be used as a tool to advocate a shift toward less water intensive crops.
- Provide marginal and small land holders, as well as tenants, access to and information about institutional credit.
- Conduct an assessment of the exact area of farm land lost to sea water intrusion and salinity in the Indus Delta region.
- Provide incentives for cultivation of resilient crops such as potato in water-stressed areas and provide farmers with business development and value chain services.
- Make it mandatory for the Water Users Associations and Abadkar Boards to have representation of small and marginal land holders and religious minorities in proportion to their numbers.
- Invest in research on drought and salinity resistant crops. Enhance the role and capacity of extension workers to work with farmers for climate change adaptation.
- Check water theft through direct canals established by large land holders to allow equitable access to available irrigation water

## 6.5 Disaster Preparedness

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- Revise the existing District Disaster Management Plans to include mangroves conservation as a possible means of defense against the impact of storms and cyclones.
- Incorporate standard operating procedures for migration management in disaster preparedness documents and build capacity around that area.
- In the light of extremely low levels of participation in disaster management planning, increase community involvement through grassroots meetings focusing on women and religious minorities. Expand the media mix for information dissemination around disaster issues by tapping into radio, television, cell phone, posters and other easily accessible and visible means of communication.
- Compensate those who suffered losses due to a breach in the LBOD during the 1999 cyclone. In the light of the fact that only a few people have recovered the losses suffered due to extreme events, advocate for funds to be earmarked for the unfinished business of rehabilitation and rebuilding of lives in the Indus Delta.

## 6.6 Health and Education

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- Invest in research and surveillance of diarrheal and water-borne diseases in the context of climate change. Build the capacity of public health professionals to conduct research on health hazards related to climatic changes, environmental degradation and extreme events. Undertake a mapping exercise around health-related vulnerabilities in the context of climate change for specific groups and sub-regions within the Delta.

- Initiate mobile dispensaries to reach out to island communities and those in Lower Thatta with extremely limited access to public health services.
- Invest in preventive health care to reduce the occurrence of diarrheal diseases.
- Improve access to ante-natal and post-natal care to bring it at par with national averages at the very least.
- Increase the number of middle schools and higher schools in both districts in the light of demographic changes occurring in Pakistan, which point to an increasing share of the youth in the overall population and a relative reduction in the share of young children.
- Design school enrolment campaigns to focus on fisher folk and marginalized castes, such as Bheel and Kohli communities.

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## ANNEX I- METHODOLOGY

Terms of Reference (ToRs), developed by Oxfam GB and finalized in consultation with the author, provided a broad framework for the study to be conducted. The process began with a review of proposed methodology and objectives. The Scoping Study aimed at:

- Exploring the links between migration and water stress and other environmental factors, such as natural disasters and climate variability.
- Analysing the impact of the arrival of irregular foreign migrants in the Indus Delta on local society and economy.
- Assessing the social and psychological costs of migration on families left behind, with a focus on women.
- Reviewing the impact of water availability on local livelihoods with a focus on smallholder farmers and fishing communities
- Recommending policy interventions and support mechanisms to deal with livelihoods and migration issues in the context of climatic changes and water stress.

Following the clarification of the scope and finalization of research questions, a literature review was carried out to critically analyze contemporary debates on the links between climate change, water stress and migration globally and in the context of the Indus Delta. Relevant policy documents were also reviewed to put primary data into a policy context.

Based on literature review, primary research instruments were developed, which included a survey questionnaire and interview schedules for key informants, community members and migrants in Karachi and Hyderabad. The questionnaire was translated into Sindhi and pre-tested in Thatta.

Survey Sample was drawn using multi-stage cluster sampling. First, each district was divided into two clusters based on geographical regions. Thus, we have Lower Thatta and Upper Thatta and Lower-Central Badin and Upper Badin. Minimum sample size was calculated for each cluster based on current population estimates using confidence level of 95 % and confidence interval of +- 5. A union council was then picked up randomly from each *taluka* within a cluster. The two largest *talukas* had two union councils selected. The sample for each cluster was distributed across UCs proportionate to the population of its *taluka* in a given cluster. Finally, at the UC level, the sample was further sub-divided into villages/localities and stratified to ensure coverage of women and religious minorities. The survey was conducted in 66 villages and 6 urban localities.

## **Annex II- List of Key Informants**

1. Ejaz Ahmed, Manager, WWF Islamabad
2. Ghazanfar Ahmed, Head Water, GCISC
3. Dr. Pervaiz Amir, Asianics Agro Development International
4. Abdul Razzaq Baloch, DDO Agriculture Extension, District Badin
5. Iqbal Hyder, President, Laar Human Development Programme (LHDP)
6. Mohsin Iqbal, Head Agriculture, GCISC
7. Muhammad Iqbal Jamali, Programme Officer, Aga Khan Planning and Building Service, Thatta
8. Shahjahan Khawja, Project Coordinator, Aga Khan Planning and Building Service, Thatta
9. Dr. Shaukat Hayat Khan, Director General National Institute of Oceanography
10. Zulfiqar Ali Malkani, District Project Manager, Sindh Coastal Community Development Project, Thatta
11. Mohammad Ali Shah, Chairperson, Pakistan Fisher Folk Forum
12. Syed Muzaffar Hussain Shah, ADO Fisheries, District Badin
13. Musarat Mandrio, Deputy General Secretary, Pakistan Fisher Folk Forum Thatta
14. Dr. Mohammad Moazam, Director General, Marine Fisheries Department, Government of Sindh
15. Nawaz Memon, Sindh Abadkar Board, Badin
16. Naseer Memon, CEO, SPO
17. Munir Sheikh, Head Climate Change, GCISC
18. Ali Tauqeer Sheikh, CEO LEAD Pakistan
19. Khadim Talpur, President Society for Science Education & Research, Badin
20. Zahid Hussain Jalbani, Site Manager, WWF Kinjhar Lake Site Office
21. Tahir Qureshi, Coastal Ecosystem Expert, IUCN
22. Zafar Wassan, Divisional Forest Officer, Thatta

# Annex III-Survey Questionnaire

Questionnaire No

**OXFAM GB**

**SCOPING STUDY ON MIGRATION, WATER STRESS AND CLIMATE CHANGE**

**(April 2010)**

**(Survey Questionnaire)**

**SECTION A : IDENTIFICATION**

A01	Date	<input type="text"/> <input type="text"/> <input type="text"/>		
A02	Cluster Name	_____	Code	<input type="text"/> <input type="text"/>
A03	District Name	_____	Code	<input type="text"/> <input type="text"/>
A04	Taluka Name	_____	Code	<input type="text"/> <input type="text"/>
A05	Union Council	_____	Code	<input type="text"/> <input type="text"/>
A06	Village/Mohallah/Location	_____	Code	<input type="text"/> <input type="text"/>
A07	Name of the Interviewer	_____		
	Signature	_____		
A08	Name of the Supervisor	_____		
	Signature	_____		

**SECTION B: Household Profile & General Information about the Respondent**

B01 Full Name of the Respondent: \_\_\_\_\_

B02 Gender of the Respondent

1. Male
2. Female

B03 What is your age in years? \_\_\_\_\_ Years *(Do not administer the questionnaire to respondents less than 18 years. Politely ask for a replacement)*

B04 What is your marital status?

1. Married
2. Never Married
3. Divorced
4. Widow/Widower
5. Other (Please Specify) \_\_\_\_\_

B05 Are you the head of the household?

1. Yes
2. No

*(If the answer is "No" ask B06. Otherwise ask B07)*

B06 What is your relationship to the household head?

- |             |                       |
|-------------|-----------------------|
| 1. Wife     | 9. Daughter-in-law    |
| 2. Husband  | 10. Sister-in-law     |
| 3. Son      | 11. Son-in-law        |
| 4. Daughter | 12. Nephew            |
| 5. Brother  | 13. Niece             |
| 6. Sister   | 14. Uncle             |
| 7. Father   | 15. Aunt              |
| 8. Mother   | 16. None of the above |

B07 How many members are there in your household?

*(Write in numbers. Write 99 if the respondent does not know)*

- A. Adults \_\_\_\_\_  
B. Children \_\_\_\_\_

B08 Are there children between 5-15 years of age in your household who are currently not enrolled in a school?

*(Write in numbers. Write 0 if there are no such children. Write 99 if the respondent does not know)*

- A. Boys----- B. Girls-----

*(Skip B09 if there are no such children. Otherwise ask B09 now)*

B09. Fill out the table below for only those children in the household who are currently working?

No.	Kind of Work	Remuneration System		Monthly Incomes
		1. Salary	2. Daily Wages	
1.				
2.				
3.				
4.				
5.				
6.				
7.				

B10 What is your mother tongue?

*(Do not read out options)*

- |                        |                                 |
|------------------------|---------------------------------|
| 1 Sindhi               | 5 Pashto                        |
| 2 Seraiki              | 6 Marwari                       |
| 3 Balochi/<br>Barochki | 7 Brahvi                        |
|                        | 8 Bengali                       |
| 4 Punjabi              | 9 Urdu                          |
|                        | 10 Other (Please Specify) _____ |

B11 What is your religion? *(Do not read out options)*

- |             |                                |
|-------------|--------------------------------|
| 1 Muslim    |                                |
| 2 Ahmadi    |                                |
| 3 Hindu     | 5 Other (Please Specify) _____ |
| 4 Christian |                                |

B12 Would you like to tell us what caste you belong to? *(Do not read out options. Check only one)*

- |                |                           |
|----------------|---------------------------|
| 1. Bhadalo     | 14. Richa                 |
| 2. Bheel       | 15. Memon                 |
| 3. Jat         | 16. Rajo                  |
| 4. Jati        | 17. Mirbhar               |
| 5. Junejo      | 18. Panhawar              |
| 6. Khatti      | 19. Parihar               |
| 7. Khashkeheli | 20. Perozani              |
| 8. Mallah      | 21. Ronjha                |
| 9. Mandhro     | 22. Syed                  |
| 10. Malkani    | 23. Samoo                 |
| 11. Meghwar    | 24. Cannot Say            |
| 12. Marghar    | 25. Other _____ (Specify) |
| 13. Kohli      |                           |

B13. Are you or your household engaged in fishing or agriculture at the moment? *(Read out options. Check only one)*

- Fishing
- Agriculture
- Both
- Neither of these

B14. What would you say is your own main profession? *(Do not read out options)*

- |             |                  |
|-------------|------------------|
| 1 Housewife | 3 Seeking Work   |
| 2 Retired   | 4 Fishing (Seth) |

- |  |   |
|--|---|
| 5 Fishing (Khalasi)                          | 16 Rural Labourer (Other than Farm Labourer)          |
| 6 Fishing (Nakho)                            | 17 Middleman in Agriculture                           |
| 7 Fishing (Sarang)                           | 18 School Teacher                                     |
| 8 Fishing (Middleman/Agent)                  | 19 Government Servant (Other than Teacher)            |
| 9 Fish Processing/Prawn or Shrimp Processing | 20 Private Sector Employee (Other than Teacher)       |
| 10 Fishing (Other)                           | 21 Paid Domestic Worker                               |
| 11 Donkey-cart Operator                      | 22 Industrial/Urban Manual Labour                     |
| 12 Land-owning Farmer                        | 23 Self-employed/ Shop-Owner                          |
| 13 Tenant (Share-cropper)                    | <input type="checkbox"/> Other (Please Specify) _____ |
| 14 Tenant (On Rent or Lease)                 | <input type="checkbox"/>                              |
| 15 Farm Labourer                             |   |

B15 What is your approximate household income in Rupees? \_\_\_\_\_ (Write 99 if the respondent does not know)

B16. Do you own any cultivable or cropped land?

1. Yes
2. No

*(If the answer is "Yes" ask B17. Otherwise ask B18 now)*

B17 If yes, how much land do you own in your name?

\_\_\_\_\_ Acres (Write in numbers. Write 99 if the respondent does not know)

B18. Do you or your household own any livestock or animals?

1. Yes
2. No

*(If the answer is "Yes" ask B19. Otherwise ask B20 now)*

B19. If yes, please specify the numbers?

*(Write numbers against each type of animal in the second column)*

Type of Livestock	Numbers
A. Goats	
B. Sheep	
C. Cows	
D. Buffalo	
E. Camel	
F. Donkey	
G. Horse	
H. Other _____ (Specify)	

B20 What is the main source of drinking water for the household?

1. Tapped Water inside the House
2. Tapped Water outside the House
3. Hand Pump
4. Open Well
5. Covered Well
6. Pond
7. Stream or River
8. Purchased from supplier
9. Other \_\_\_\_\_ (Specify)

B21 How do you treat water before drinking?

1. Do not treat
2. Boil it
3. Chlorine Tablets
4. Filter Machine
5. Other\_\_\_\_\_

B 22. Did your family suffer any loss of assets due to a natural disaster during the past 5-10 years? *(Check multiple answers under both columns if required. Do not read out options. Check option A, if the respondent does not report having suffered any loss)*

Due to Storms/Rains or Cyclone	Due to Drought
A. None	A.None
B. Loss of crops	B. Loss of crops
C. Loss of shop/business premises	C. Loss of shop/business premises
D. Loss of livestock	D. Loss of livestock
E. Damage to house	E. Damage to house
F. Loss of fishing resources	F Loss of fishing resources
G. Other_____ (specify)	H. Other_____ (specify)

(If the answer is "None" under both columns, move on to B24. Otherwise, ask B23 now)

B 23. To what extent would you say you have recovered the loss you suffered?  
*(Read out the options. Check only one)*

1. To a great extent
2. To some extent
3. Not at all
4. Not sure

B24. Did you suffer any of the following symptoms or illnesses during the past six months? *(Read out options. Check multiple options if required)*

- |                                   |                         |
|-----------------------------------|-------------------------|
| A. Dizziness                      | F. Watery Eyes          |
| B. Diarrhea                       | G. Sleeplessness        |
| C. Rashes or other skin problems  | H. Other_____ (Specify) |
| D. Fever                          | I. None at all          |
| E. Breathing/Respiratory problems |                         |

B25. How many children in the household have been continuously ill for at least the past three months?\_\_\_\_\_ (Write 0 if there are no such children)

B26 Which type of health facility is available within 5 kilometers' distance to your place of residence? *(Do not read out options. Check only one)*

- |                                 |                              |
|---------------------------------|------------------------------|
| 1 BHU/Government Dispensary     | 4 Private Clinic or Hospital |
| 2 RHC/Small Government Hospital | 5 Other_____ (Specify)       |
| 3 THQ/DHQ                       | 6 Not Sure                   |

*(If the response is 1-4, ask B27, otherwise move on to B28 now)*

B27 How satisfied are you with that facility? *(Read out options)*

- 1 Highly satisfied
- 2 Satisfied
- 3 Neither Satisfied nor Dissatisfied
- 4 Dissatisfied

- 5 Highly dissatisfied
- 6 Do not know

B28. What was the highest education level you completed (in number of years)? \_\_\_\_\_ (Write 0 if the respondent has never attended school)

B29. Can you read any language?

- 1 Yes
- 2 No

B30. Can you write in any language?

- 1 Yes
- 2 No

**SECTION C: MIGRATION HISTORY AND FUTURE PLANS**

C01 Have you always lived in this taluka?

- 1 Yes
- 2 No

*(If the answer is No, ask C02 and questions that follow. Otherwise move on to C05 now)*

C02 When did you move into this taluka?

\_\_\_\_\_ (Write Year)

C03 What taluka and district did you come from?

*(Write the name of the taluka and the district. Write down the name of the country if the respondent is an immigrant)*

A. \_\_\_\_\_ Taluka

B. \_\_\_\_\_ District

C. \_\_\_\_\_ Country

C04 What made you leave the place (taluka/district/country) you originally lived in? *(Do not read out options. Check multiple answers if required)*

- A. Poverty
- B. Lack of Adequate Food
- C. Lack of Employment
- D. Decline in Fish Catch
- E. Poor Crop
- F. Loss of Agricultural Land to Sea/Salinity
- G. Drought
- H. Floods or Storms
- I. Being in Debt
- J. Lack of Drinking Water
- K. Lack of Education Facilities
- L. Lack of Health Facilities
- M. Exploitation by Agent/Middlemen
- N. Due to Marriage
- O. Other \_\_\_\_\_ (Specify)

C05 Do you have any member of your household settled elsewhere for work?

- 1 Yes
- 2 No

*(If the answer is "No" skip questions C06 through C13 and ask C14 now. Otherwise ask C06 and questions following it)*

C06 If yes, what is your relationship to them and when did they migrate? (Do not read out the answers)

Relationship	Numbers (Write in numbers)	First Person's Year of Migration
A. Brother	_____	_____
B. Son	_____	_____
C. Daughter	_____	_____
D. Husband	_____	_____
E. Father	_____	_____
F. Sister	_____	_____
G. Mother	_____	_____
H. Father-in-law	_____	_____
I. Nephew	_____	_____
J. Niece	_____	_____
K. Uncle	_____	_____
L. Aunt	_____	_____
M. Other _____ (Specify)	_____	_____

C07. If yes what place are they now living in?(Check multiple options if required only where there are more than one family members settled away from home for work. Otherwise check only one option)

- |                           |                                 |
|---------------------------|---------------------------------|
| A. Within Thatta District | F. Other district/city within   |
| B. Within Badin District  | Pakistan_____ (Specify)         |
| C. Hyderabad              | G. Other Country_____ (Specify) |
| D. Mirpurkhas             | H. Do not know                  |
| E. Karachi                |                                 |

C08. Have they found work at their destination? If yes what occupation are they into? (Write the numbers of family members against each occupation listed)

- A. Haven't found work\_\_\_\_\_ (Write in numbers)
- B. Fishing\_\_\_\_\_
- C. Agriculture\_\_\_\_\_
- D. Daily Wage-earners\_\_\_\_\_
- E. Private Sector Job\_\_\_\_\_
- F. Government Job\_\_\_\_\_
- G. Other\_\_\_\_\_ (Specify)

C09. What were the reasons they decided to migrate? (Do not read out options. Check multiple answers if required)

- |   |                                      |
|---|--------------------------------------|
| A. Poverty  | H. Floods or Storms                  |
| B. Lack of adequate food                            | I. Being in debt                     |
| C. Lack of employment                               | J. Lack of Drinking Water            |
| D. Decline in fish catch                            | K. Lack of Education Facilities      |
| E. Poor crops                                       | L. Lack of Health Facilities         |
| F. Loss of agricultural land<br>to the sea/salinity | M. Exploitation by Agents/Middle men |
| G. Drought  | N. Other_____ (Specify)              |
|   | O. Do not know                       |

C10. Did any of them incur debt while moving to that other place?

- 1. Yes
- 2. No
- 3. Do not know

C11. Does your household receive any remittance from them, and if yes how frequently?

- 1. Monthly
- 2. After a few months
- 3. Rarely
- 4. Never
- 5. Other\_\_\_\_\_ (Specify)

(If the answer is 4, skip C12 and ask C13. Otherwise ask C12 now)

C12. What does the amount remitted gets spent on mostly? (Do not read out options. Check multiple answers if required)

- A. Food
- B. Utility Bills
- C. Children's Education
- D. Health
- E. Transport
- F. Dowry Collection
- G. Paying off Debt
- H. Other\_\_\_\_\_ (Specify)

C13. In overall terms, would you say you are happy that your family member(s) is/are working away from home?

- 1. Yes
- 2. No

3. Neither happy nor unhappy
4. Cannot Say

C14. Do you yourself think of migrating to some other place?

1. Yes
2. No
3. Not Sure

*(If the answer is yes, ask C15. Otherwise ask C16 now)*

C15. If yes, what are the main reasons? *(Do not read out options. Check multiple options if necessary)*

- |   |   |
|---|---|
| A. Because of Poverty                               | H. Fear of floods                       |
| B. Lack of adequate food                            | I. Being in debt                        |
| C. Lack of employment                               | J. Lack of Drinking Water               |
| D. Lack of fish catch                               | K. Lack of Education Facilities         |
| E. Poor crops                                       | L. Lack of Health Facilities            |
| F. Loss of agricultural land to the sea or salinity | M. Exploitation by Agents or Middle Men |
| G. Fear of drought                                  | N. Do not know                          |
|   | O. Other_____ (Specify)                 |

C16. Did you or members of your household go out to work elsewhere temporarily during certain seasons over the past two years?

1. Yes
2. No

*(If the answer is Yes ask C17. Otherwise move on to C18 now)*

C17. If yes where was it that they went last for seasonal work?

1. Within Thatta District
2. Within Badin District
3. Hyderabad
4. Mirpurkhas
5. Karachi
6. Other district/city within Pakistan\_\_\_\_\_ (Specify)
7. Other Answer\_\_\_\_\_ (Specify)

C18 What changes have you seen in the population of your village or locality over the past 10 years?

1. Increased Substantially
2. Increased Somewhat
3. Stayed the same
4. Reduced Somewhat
5. Reduced Substantially

**SECTION D: Only for Fishing Communities (Those reporting to be engaged in fishing or both agriculture and fishing)**

D01 Does your household own a boat? (Read out options)

- 1 Yes
- 2 No
- 3 Not Sure

*(If the answer is "Yes" ask D02. Otherwise move on to D03 now)*

D02. If yes, how big is that boat?

1. 10 feet or less
2. 11-20 feet
3. Bigger than 20 feet
4. Do not know
5. Other\_\_\_\_\_ (Specify)

D03. What kind of arrangement best describes your work as a fishing family? (Read out options)

1. On License
2. On Contract Basis
3. On Monthly wages
4. Independently without License
5. On a share in catch (Patti)
6. Do not know
7. Other\_\_\_\_\_ (specify)

D04. Are you or any member of the household bound to sell your catch entirely or in part to somebody?

- 1 Yes
- 2 No
- 3 Do not know

*(If the answer is "Yes" ask D04. Otherwise ask D05 now)*

D05. If yes, who?

1. Boat Owner
2. Agent/Middleman
3. Do not know
4. Other\_\_\_\_\_ (Specify)

D06. What kind of overall change have you observed in fish catch for your family in recent years?

- 1 Catch has Increased
- 2 Catch has Decreased
- 3 Has been no Change
- 4 Not Sure

*(If the answer is 2 ask D07. Otherwise move on to D08)*

D07. How long would you say has this problem persisted?

\_\_\_\_\_ (Years)

D08. If yes, what would you say are the main reasons? *(Do not read out options. Check multiple responses if required)*

- |   |  |
|---|--|
| A. Dearth of fresh water flowing into the Delta | G. Water pollution due to industrial waste |
| B. Deep-sea fishing                             | H. Water pollution due to pesticides       |
| C. Diminishing Mangroves                        | I. Water pollution due to sewage           |
| D. Fishing of Juvenile Fish/Shrimp              | J. Water pollution due to oil spills       |
| E. Fishing in prohibited seasons                | K. Changes in weather                      |
| F. Use of inappropriate nets                    | L. Other _____ (specify)                   |

D09. What kind of effect do you think reduction in mangroves could have on fishing community in coastal areas? *(Read out options. Check one answer only)*

1. No Effect
2. Negative Effective
3. Positive Effect
4. Not Sure

D10. Would you be able to tell us how often do you find yourself in need of borrowing money? *(Read out options. Check one answer only)*

1. Frequently
2. Sometimes
3. Rarely
4. Never
5. Cannot Say

*(If the answer is 1-3, ask D11 and D12. Otherwise move on to D13 now)*

D11. What is the main source of financial credit for your family?

1. Middleman/Agent
2. Boat-owner
3. Friends/Relatives
4. Government Institutes
5. Private Bank
6. Cannot Say
7. Other \_\_\_\_\_ (Specify)

D12. Could you tell us approximately how much money do you owe now?

\_\_\_\_\_ Rupees *(Write 99 if the respondent does not know or cannot share the information. Write the amount in Rupees)*

D.13. During the past one year, has any government official provided you any information on how to adapt fishing practices to changing climate?

1. Yes
2. No
4. Not Sure

D.14. During the past one year, has any NGO worker or volunteer provided you any information on how to adapt fishing practices to climatic changes?

1. Yes

2. No
3. Not Sure

D15. Do you think your family has the information on how to prepare to cope with floods and storms?

1. Yes
2. No
3. Not Sure

D16. Have you or any member of the household had a chance to participate in any meeting on disaster preparedness over the past two years?

1. Yes
2. No
3. Do not know

D17. Are you aware of any non-governmental or community organisation working to support the fishing communities in your area?

1. Yes
2. No

*(If the answer is "Yes" ask D18. Otherwise see the instruction below D18.)*

D18. If yes, could you name one such organisation for us please?

\_\_\_\_\_ (Write the name. Write 99 if the respondent does not know the name)

**SECTION E: For Agricultural Communities (Those reporting to be engaged in agriculture or both agriculture and fishing)**

E01. What is the main source of irrigation for the land you work on?

- 1 Canal
- 2 Tube-well
- 3 Canal and Tube-well
- 4 Rains
- 5 Other\_\_\_\_\_ (Specify)

E02. What changes have you seen in the availability of water for your crops in recent years?

*(Read out options. Check only one)*

1. Significant Decline
2. Some Decline
3. No Decline
4. Some Increase
5. Significant Increase
6. Not Sure

E03. Have you lost any of the land you work on to salinity or intrusion by the sea?

1. Yes
2. No

*(If the answer is "Yes" ask E04. Otherwise move on to E05).*

E04. If yes, approximately how much land would you say you have lost?

\_\_\_\_\_ (Acres. Write 99 if the respondent does not know the area)

E05. What crop(s) do you grow? *(Check multiple answers if required. Do not read out options)*

- |              |                         |
|--------------|-------------------------|
| A. Wheat     | G. Sunflower            |
| B. Cotton    | H. Banana               |
| C. Rice      | I. Coconut              |
| D. Sugarcane | J. Betel Leaf (Pan)     |
| E. Tomato    | K. Other_____ (specify) |
| F. Chilies   | L. None                 |

E06. Have you observed a decline in the yield of any of the following crops in your area during the past few years?

*(Read out options. Check multiple answers if required)*

- |              |                         |
|--------------|-------------------------|
| A. Wheat     | G. Sunflower            |
| B. Cotton    | H. Banana               |
| C. Rice      | I. Coconut              |
| D. Sugarcane | J. Betel Leaf (Pan)     |
| E. Tomato    | K. Other_____ (specify) |
| F. Chilies   | L. None                 |

*(If the answer is K, move on to E08. Otherwise ask E07)*

E07. If yes, what would you say are the main reasons?

*(Do not read out options. Check multiple answers if required)*

- |                             |                        |
|-----------------------------|------------------------|
| A. Inadequate water         | E. More Frequent Rains |
| B. Brackish water           | F. Less Frequent Rains |
| C. Increase in temperatures | G. Salinity            |
| D. Longer Summers           | H. Soil Erosion        |

- I. Poor quality of seeds
- J. Poor quality of fertilizers

- K. Other\_\_\_\_\_ (specify)
- L. Do not know

E08. Do you think it is necessary to adapt farming practices to changing climatic conditions?

- 1. Yes
- 2. No
- 3. Not Sure

E09. Have you tried changing your farming practices in the past 8 years or so because of changes in climate?

- 1. Yes
- 2. No
- 3. Not Sure

*(Ask E10 if the answer is "Yes". Otherwise move on to E11 now)*

E10. How successful would you say you have been with new farming practices you adopted? (Read out options. Check only one)

- 1. Most Successful
- 2. Successful
- 3. Neither Successful not Unsuccessful
- 4. Unsuccessful
- 5. Most Unsuccessful
- 6. Not Sure

E11. How aware would you say you are of drought resistant crop varieties?

- 1. Well Aware
- 2. Aware
- 3. Not aware

E12. During the past one year, has any government official provided you any information on how to adapt your farming practices to changing climatic conditions?

- 1. Yes
- 2. No
- 3. Not Sure

E13. During the past one year, has any NGO or volunteer provided you any information on how to adapt your farming practices to changing climatic conditions?

- 1. Yes
- 2. No
- 3. Not Sure

E14. How often do you find yourself in need of borrowing money? (Read out options. Check one answer only)

- 1. Frequently
- 2. Sometimes
- 3. Rarely
- 4. Never
- 5. Cannot Say

*(Ask E15 and E16 if the answer is 1-3. Otherwise ask E17 now)*

E15. What is the main source of financial credit for you?

- 1. Landlord
- 2. Middleman
- 3. Professional Moneylender
- 4. Friends/Relatives
- 5. Government Institution
- 6. Private Bank
- 7. Other\_\_\_\_\_ (Specify)

E16. Could you tell us approximately how much money do you owe now?

\_\_\_\_\_ Rupees (*Write 99 if the respondent does not know or cannot share the information. Write the amount in Rupees*)

E17. Are you or any person in your family a member of any cooperative or farmers' association?

1. Yes
2. No
3. Not Sure

E18. Are you aware of any non-governmental or community organisation working to support the agricultural communities in your area?

- 1 Yes
- 2 No

*(If the answer is "Yes" ask E19. Otherwise close the interview now)*

E19. If yes, could you name one such organisation for us please?

\_\_\_\_\_ (Write the name. Write 99 if the respondent does not know the name)

## Annex IV-List of Talukas and Sampled UCs

Cluster	Taluka	Union Council
Lower Thatta	Ghorabari	Uddasi
	Jati	Mureed Khoso
	Keti Bundar	Keti Bundar
	Kharo Chan	Kharo Chan
	Mirpur Sakro	Choubandi
	Shah Bundar	Chhachh
Upper Thatta	Mirpur Bhaturo	Mehar Shah
	Sujawal	Kinjhar
	Thatta	Makli
		Jhampir
Lower-Central Badin	Badin	Badin 3
		Bhugra Memon
	SF Raho	Ahmed Rajo
	Talhar	Saeedpur
Upper Badin	Matli	Malhan
	Tando Bago	Pahar Mari
		Khairpur Gambo

