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# Gender and Social Vulnerability to Climate Change

A Study of Disaster Prone Areas in Sindh



Social Policy and Development Centre





# Gender and Social Vulnerability to Climate Change:

*A Study of  
Disaster Prone Areas in Sindh*

**SPDC**

SOCIAL POLICY AND DEVELOPMENT CENTRE

2015

The views expressed in this report represent those of the research team, and do not necessarily represent the views of the donors.

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Printed in Karachi by Times Press (Pvt.) Ltd.



## Foreword

Climate change, coupled with natural disasters, is linked with the livelihoods of rural communities and hence with their food security. People experience natural disasters depending on the extent to which they are vulnerable to the associated risks. Likewise, it is also widely accepted that the impacts of climate change are not gender neutral. The social structures, power dynamics and the role that men and women play both at home and within the community influence the perception and the impact as they are understood and interpreted at societal or individual level. Pakistan is one of the least studied countries in terms of socio-economic impacts of climate change. Therefore, the challenge is to address the knowledge gap and to provide evidence based input to policies and programmes meant to reduce social vulnerability of the people in comparatively more disaster prone areas of Pakistan.

This report consolidates the finding of research project entitled ‘Gender and Social Vulnerability of Climate Change: A Study of Disaster Prone Areas in Sindh’. The project is part of Climate Change Adaptation, Water and Food Security in Pakistan, which is a research initiative of the International Development Research Centre (IDRC), Canada. The study has been conducted in four districts of Sindh –Badin, Dadu, Thatta and Tharparkar. In addition to this consolidated report, working papers on each study district are also being published, which provide detailed analyses of social vulnerability in the local and national context.

This report is an attempt to contribute to the knowledge regarding gender and socio-economic aspects of climate change in the context of Pakistan. The analysis presented in the report reveals that communities in the disaster prone areas are already experiencing profound transformations in their lives – both as a result of climate change and socio-economic change. It is, therefore, important to adopt policies that promote adaptation and resilience based upon present day stresses. It is hoped that the publication will be of interest and value to the various stakeholders including policymakers, parliamentarians, academics, development practitioners, civil society activists, donors, and others in Pakistan and abroad.

Dr. Khalida Ghaus  
Managing Director  
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## Acknowledgements

Social Policy and Development Centre (SPDC) would like to acknowledge numerous people and institutions whose collective efforts and support contributed to successful completion of this report.

SPDC is specially indebted to the members of the Project Advisory Committee consisting of Mr. Javed Jabbar who very kindly consented to chair the committee, Mr. Naseer Memon of Strengthening Participatory Organization and Dr. Uzma Shujaat of Area Study Centre for Europe, Mr. Iqbal Memon of Government of Sindh, and Dr. Abid Suleri of Sustainable Development Policy Institute for their support and guidance. Thanks are due to Dr. Sara Ahmed, Senior Program Specialist, IDRC, who provided her support during the entire course of the project.

We would like to thank Dr. Mohsin Iqbal and Mr. Arif Goheer of Global Change Impact Study Centre for conducting analysis of climate data. The contribution of field staff that conducted/ facilitated focus group discussion cannot be over-appreciated. In this regard, we acknowledge the hard work and dedication of Mr. Aftab Ahmed Mangi, Ms. Tasneem Bhatti, Ms. Bushra Memon, Mr. Muhammad Iqbal Dars, Mr. Mohram Ali Channa, Mr. Mukhtiar Ali Panhwar, Mr. Ubaidullah Bhutto, and Ms Seema Rana. Thanks are also due to Mr. Bilal Brohi of Electric Room Studio and his entire crew members for preparing the documentaries based on the research undertaken on the four districts identified for the project.

We are thankful to our local partner organizations for providing logistic as well as technical support for conducting field research in the respective districts. These organisations include Society for Environmental Actions, Reconstruction and Humanitarian Response (Dadu), Badin Development and Research Organization (Badin), Baanh Beli (Tharparkar), and Sindh Radiant Organisation (Thatta).

In particular, we would like to express our gratitude to the women and men of all those villages that participated in this research and shared their experiences. This research would not have been possible without their cooperation and their willingness to talk both with the survey team members and in front of the camera.

We are grateful to all the government departments that provided the required data and information. SPDC is indebted to the offices of Deputy Commissioners of all the four districts for providing their support and facilitation as and when needed during the field work.

Special thanks to IDRC and Royal Norwegian Embassy (Pakistan) for providing financial support to undertake research on an important issue.



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# Executive Summary

Like many other countries in the developing world, Pakistan is experiencing the impact of climate change at the same time is undergoing a socio-economic transition - a combination which, poses significant challenges, particularly for vulnerable populations. This report looks at the experience of climate and social change among rural communities in disaster prone areas of Sindh, with particular focus on gendered impacts. It also assesses people's capacity at the local level to cope/adapt to these changes. Based on the findings, it makes a number of gender specific policy recommendations for inclusion in disaster management and climate change adaptation strategies at provincial and local level.

The study, commissioned by IDRC, was conducted in four districts of Sindh: Badin, Dadu, Tharparkar and Thatta. It covered four agro-ecological/livelihood zones: canal irrigated with fresh groundwater, canal irrigated with saline groundwater, agro-pastoral and fishing communities. A total of 62 rural communities and 1,259 households were assessed using a mixture of qualitative and quantitative tools/techniques including community and household level surveys, focus group discussions and key informant interviews. The main quantitative tool was the Vulnerability and Capacities Index (VCI), which looks at twelve drivers of vulnerability, divided into three categories: material, institutional and attitudinal. A high VCI score indicates high vulnerability relative to other communities, and conversely a low VCI score points to relatively low vulnerability. The SPDC methodology went beyond the VCI to gather additional information, e.g. about health status. Such data (as well as findings from the focus group discussions) was used to validate the VCI findings.

Overall the survey households and communities were found to be highly vulnerable with very limited adaptive capacity. The VCI tool indicates that stability of income, quantum of assets and social capital are the key factors that describe the variance in the household level



vulnerability scores. At inter-community level quality of infrastructure along with overall educational attainment of the community are two of the largest drivers of variance in VCI scores. Significant difference was found in VCI for male and female headed households; indeed, almost all the extremely vulnerable households are female-headed. Examination of qualitative data about individual households did in general validate the VCI scores. However, while high VCI scores represent gendered vulnerability well, low vulnerability scores could hide constraints to female empowerment within households and communities, that can be essential for building resilience. This points to the need for qualitative research to complement VCI findings and better understand gender differentiated vulnerability profiles.

Pearson's correlation tests were conducted on the aggregated household VCI scores for communities (20 households in each village) and the community VCI scores. The tests found a highly significant but weak correlation, showing that community level VCI can be used as a general guide to community vulnerability without having to conduct household level vulnerability assessment – this does not apply, however, for communities where there is significant household level variation in VCI scores. Comparison of community level VCI scores for the four agro-pastoral zones found little difference in scores for irrigated freshwater and saline communities. However, the mean scores for agro-pastoralist were significantly higher, and for fishing communities higher still. The difference can be accounted for by the fact that agro-pastoralist and fishing villages are more directly dependent upon natural ecosystem services than irrigated communities, and there is a greater presence of the state in the latter.

As noted above, the SPDC study looked at a number of wider (beyond the VCI) development aspects at household and community level. Macro-indicators were access to roads and other infrastructure essential for economic development, and presence of education and health facilities; micro-indicators were household monthly income and expenditure, illiteracy and unemployment rates. The study found that while some development indicators converged with VCI findings, there was also some divergence. Thus, access to services (health, education) and roads was positively associated with vulnerability, education partially so, but quantum of income or poverty level was not a good indicator of vulnerability – more significant was the stability and diversity of income. The implications are that income/poverty level should not be used as a surrogate for vulnerability, and the state –

which bears responsibility for service provision – has a pivotal role to play in determining vulnerability.

The focus group discussions – conducted separately for men and women – yielded a wealth of information about people’s perceptions and experience of climate change, the position of women and the differential impact of environmental and social change on them. Communities across all four agro-ecological zones reported marked changes in the climate around them – erratic rainfall, changed onset of seasons, reduced water, more extreme temperatures – and increase in the frequency and intensity of natural disasters. As a consequence traditional sources of livelihood (fishing, livestock, agriculture) are seriously threatened and people’s quality of life (access to food, water, health status and so on) has deteriorated. Key coping/adaptation strategies are migration, seeking alternative sources of livelihood and borrowing. However, in all agro-ecological zones, options for alternative sources of livelihood are limited.

What also clearly emerges from the discussions is that women suffer disproportionately: their already disadvantaged position in society is made much worse by the challenges posed by climate change. For example, migration of males in search of alternative sources of income increases the already heavy workload of women. Similarly, as the quantity and quality of food available to families is reduced, women’s share of this falls disproportionately. The focus group discussions also explained some of the divergence between VCI scores and gendered vulnerability noted earlier: in Khat Lashker, for example, higher education levels had been accompanied by greater religiosity, leading to greater purdah and mobility restrictions for women.

The institutional environment for managing adaptation to climate change in Pakistan remains fragmented and relatively ineffectual. The governmental institutions fall into two parallel streams: the older institutions that have the budgets and legal mandate to [somewhat indirectly] tackle climate related challenges, e.g., revenue, and irrigation departments at the provincial levels and the FFC, WAPDA, PMD and the military at the federal level; and the purpose-built newer institutions that however, have ambivalent and overlapping legal authority and virtually no budgets to do their jobs, e.g., NDMA, PDMA, DDMA, and Climate Change Division. Numerous policies and plans have been formulated addressing risk reduction as well as emergency response, but in the absence of strong implementing bodies, they are far from being translated into practice. The less than optimal response

to the devastating 2010 floods highlighted the shortcomings in disaster management on the part of the state in Pakistan. These shortcomings are offset, to some extent, by the efforts of civil society – local, national and international NGOs – and international donor agencies. However, their interventions are typically heavily resource constrained, limited in scope and thus not sustainable in the long-term.

Against this backdrop, it is not surprising that the specific and pressing needs of women in disaster situations have been neglected. At the legislative and policy level, the GoP continues to have legal and stated commitment to mainstreaming gender in its climate and environment related policies. In reality, though, there is very little understanding or internalization of gender issues. It is always tacked on almost as an afterthought and then, too, as something to do with women alone in every policy document. There is little understanding and perhaps even sympathy towards how to mainstream it.

In conclusion, the findings of this report clearly show that people in the study areas are already experiencing profound transformations in their lives – both as a result of climate change and socio-economic change (urbanization, modernization, etc). It is therefore vital to treat climate change as a present and pressing reality - rather than as some future biophysical threat - and to promote climate adaptation and resilience based upon present day stresses. In light of the study findings, a number of general recommendations are made, indicative of the types of directions that developmental and adaptive interventions could take. The far from exhaustive list includes:

- Incorporating the VCI into the workings of state institutions: data collection could be carried out by DDMA's, and in turn help them direct relief aid more effectively in the aftermath of a disaster and ensuring better provincial level planning;
- Focusing developmental and adaptation interventions on agro-pastoral and fishing communities (including programs for sustainable fishing livelihoods) because of their significantly higher vulnerability compared to irrigated communities;
- Carrying out more analysis and research to understand differences in vulnerability and drivers of this for irrigated freshwater and saline communities;
- Focusing on education provision not just on quantitative measures (number of children in school) but also on quality of education to avoid the type of perverse gender status outcomes highlighted in this report;

- Carrying out specific interventions to address the issue of women's increased workload in the absence of migrant males in the households;
- Promoting and building capacity of traditional health care workers, e.g. dais, so they can provide basic, affordable health care to women locally;

It is hoped that the research tools and insights offered in this report will provide pathways to mitigating gendered vulnerability in the here and now, so that the future can be met from a position of strength instead of vulnerability.



# Introduction

## Context and Literature Review

---

International scientific opinion has reached consensus (or as close as it is ever likely to get) about the existence of anthropogenically induced climate change (IPCC 2013). Simply stated, the carbon emissions from fossil fuel burning since the Industrial Revolution have measurably increased the carbon concentrations in the atmosphere, leading to the 'greenhouse effect'. The increase in carbon in the atmosphere will have complex and geographically varied impacts on seasonal temperatures, hydro-meteorology and consequently on dependent ecologies, agro-ecologies and human production systems. More frequent and severe extreme weather events such as floods and droughts are one consequence already being seen across the world.

Most of the knowledge about climate change consequences is surmised from the computerized model runs of the General Circulation Models (GCMs), but these vary in their predicted climate scenarios and their spatial resolution. Nevertheless most model runs for North-Western South Asia, particularly coastal Pakistan, seem to predict more frequent higher intensity rainfall events and an increase in average winter temperatures (IPCC 2013). Regardless of the confidence level in individual scenarios, it is almost certain that historical hydro-climatic patterns are not going to hold into the future as a result of climate change. Pakistan, like most countries in the global South is also experiencing a socio-economic transition, principally the transition from purely rural and urban livelihoods towards mixed urban/rural (desakota) livelihoods (The Desakota Team 2008). The existing hydro-climatic regimes coupled with the human social systems offer formidable enough challenges to securing sustainable livelihoods, ecosystem services and welfare gains. The challenges are likely to become even more formidable through the double exposure to climatic

and socio-economic systemic change (Leichenko and O'Brien 2008). This is the climate change context within which, the findings of this study must be viewed.

This study is not going to take the GCM generated climate scenarios as its starting point of what the vulnerability to climate change is likely to look like in the future. Instead, following Wescoat (1991) and most recent scholarship by Hulme (2009) the study will focus on current water problems and vulnerabilities arising from that, and the present cultural idioms that mediate the experience of vulnerability. This approach, anchored in the concern with building resilience to the vulnerabilities of the present, is more likely to influence change in behavior to build resilience to future climate change. Furthermore, such a focus on the present must not assume some sort of predictability about the future based upon past averages, but rather be mindful of the existing experiences of hydro-meteorological and social change and how that change is being negotiated by the vulnerable populations. This report is an attempt at documenting such experiences (also for another example of such experience in Nepal see Manhandar et al. 2011, and NCVST 2009).

The issue of vulnerable populations is a problematic one as well. This report understands vulnerability, beyond a biophysical condition, as susceptibility to suffer damage from extreme events and relative inability to recover from that damage (Mustafa 1998 and Mustafa *et al.* 2010). People's susceptibility to suffer damage is embedded in everyday power relations and political economy and can be inflected by class (Mustafa 2005, Pelling 1997), gender (Sultana 2010), and ethnicity (Bolin 2007) among other factors. Wisner *et al.* (2004) formulated a Pressure and Release (PAR) model to illustrate the progression of vulnerability from root causes, e.g. social power relations, political economy, developmental discourses and patriarchy, to dynamic pressures, e.g. weak institutions, corruption, and environmental degradation, to unsafe conditions, e.g. malnutrition, occupation of flood plains or other exposed locations, and poor construction quality. In the PAR model disasters come about when unsafe conditions converge with extreme physical events, e.g. earthquakes, floods, climate change. Within this formulation then, vulnerability originates in the root causes that also are determinants of the contours of everyday life. Given that gender, ethnicity, class and other such metrics of identity influence everyday life, they also inevitably bear upon the vulnerability of individuals and communities.

The Pakistani situation with regard to power fault lines along ethnic, class and in particular gender lines are well known and highly problematic, e.g. Pakistan stands 135<sup>th</sup> out of 136 countries in the 2013 Gender Gap Report (Haider 2013).

The rationale and objectives of the study outlined below should be understood in this context and the conceptual framework.

#### Box 1.1: Terminology

**Adaptation** refers to a suit of policies, interventions, and behavioral changes that individuals and societies are supposed to implement in order to adapt to the threats and opportunities to emerge from climate change.

**Climate Change** refers to the phenomena of the change in regional and global climatic patterns largely as a consequence of the accumulation of carbon, from fossil fuel burning since the Industrial Revolution.

**Gender** beyond the biological sex amongst humans, refers to the socially adopted roles and mannerisms that define masculinity and femininity. Such socially determined roles and power relations are often justified in the name of biological difference, and hence the particularly resilient and insidious nature of the gender roles.

**Hazards** by definition can only come about when a vulnerable human population comes into contact with an environmental extreme.

**Vulnerability** is the susceptibility to suffer damage from an extreme event and the relative inability to recover from that damage (Mustafa 1998).

### Rationale and Objectives of Study

---

Vulnerability to climate change and drivers of it are predicated upon the present state of development and welfare in the countries of the global South like Pakistan. Pakistan, like most other countries of the global South, is experiencing unprecedented environmental and socio-economic transition. The vulnerability to climate change of this country therefore, must also be understood in the context of this unprecedented transition. While there has been an increase in research on climate change in Pakistan in recent years, the topic is still significantly under-researched. Moreover, there are major gaps in understanding of social vulnerabilities differentiated by gender and their contribution to climate change impacts and coping strategies.

This study aims to address the knowledge gaps in the existing research and provide the missing information to influence plans for adaptation and disaster management at local and national level. The project -



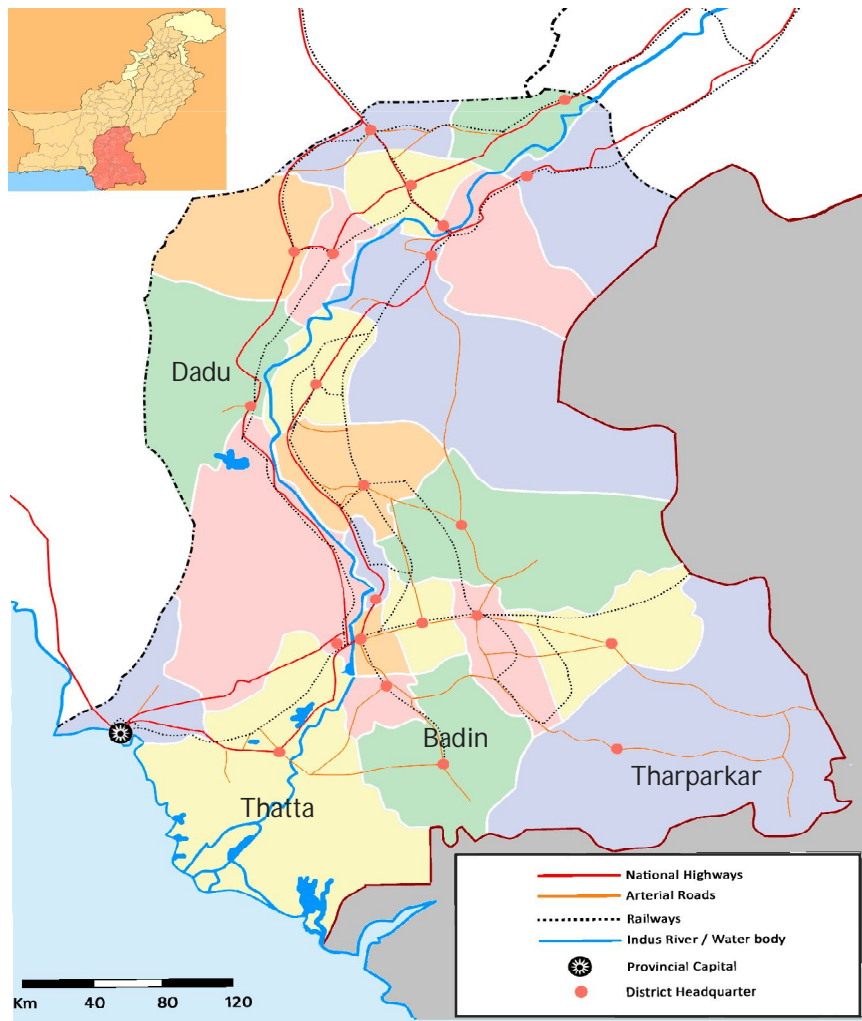
‘Gender and Social Vulnerability to Climate Change: A Study of Disaster Prone Areas in Sindh’ - was commissioned by IDRC Canada, and undertaken by the Social Policy Development Centre (SPDC). It is funded by IDRC and, until February 2014, by the Royal Norwegian Embassy, Pakistan.

The specific objectives of the study are as follows:

- To investigate gender dimensions of socio-economic vulnerability to climate change among rural communities of disaster prone areas in Sindh;
- To assess the adaptive capacity of men and women at community level and the social capital available to them;
- To formulate a set of gender specific policy recommendations for inclusion in disaster management and climate change adaptation strategies and plans at provincial and district levels;
- To build awareness and understanding among stakeholders including communities, civil society, media, academia, government and international development partners.

Given the environmental and socio-economic transition Pakistan is undergoing, four districts close to the commercial and business hub of the country and its largest city, Karachi were chosen to undertake a climate and hazard vulnerability assessment. The assessment is directed towards understanding the drivers of vulnerability, vulnerability profiles and associations of those profiles with other indicators of poverty, environmental quality, and general well-being at the household and community level. In addition to the substantive objectives, the research is also directed towards fine tuning and validating a methodology for assessing social vulnerability at the local scale.

The four study districts (Figure 1.1) Dadu, Thatta, Badin and Tharparkar, in addition to their proximity to Karachi also characterize the challenges of climate adaptation in the lower Indus Basin. The lower Indus Basin with its largely arid climate, irrigated agriculture, saline groundwater—with the exception of tracts along the main stem Indus, previously rich fresh and salt water fisheries, vibrant pastoralist and agro-pastoralist communities, and issues of salt water intrusion, encapsulates the socio-environmental stressors that will influence experience of climate change in most arid deltaic environments across the globe, e.g., the deltas of the rivers Nile, Colorado, Tigris/Euphrates to name a few. The results of the field study presented in this report



**Figure 1.1:** Map showing the study areas

are therefore not only relevant to understanding climate vulnerability and adaptation challenges in Southern Pakistan, but also may be relevant to many other comparable arid lands and coastal contexts.

## Outline of Report

Chapter two details the analytical framework and methodology used in the research study. The study was conducted in four districts of Sindh (Badin, Dadu, Tharparkar and Thatta) but the findings have been categorized on the basis of agro-ecological/livelihood zones: canal irrigated (fresh groundwater), canal irrigated (saline groundwater), fishing and agro-pastoral communities. A mixture of qualitative and quantitative techniques were used, notably the Vulnerabilities and Capacities Index (VCI) quantitative tool. The limitations of the research and challenges faced are also detailed here.

Chapter three ‘Vulnerability and Capacity Analysis’ presents the VCI findings at community and household level, again categorized by agro-ecological zones. An initial analysis of the findings is carried out to account for resilient, low, moderate, high, very high and extreme vulnerability communities/households, as well as to explain any anomalies.

Chapter four ‘Vulnerability and Development’ looks at the correlation between vulnerability to climate change and developmental factors not necessarily covered in the VCI such as poverty, access to healthcare, and nutrition. Again the findings are categorized by irrigated (f), irrigated (s), fishing and agro-pastoral communities. Chapter five ‘Climate Change Perceptions and Adaptation’ details the study findings for each category with regard to people’s perceptions of climate change and the coping strategies they have adopted.

Chapter six ‘Governance and Policy Environment’ looks at the institutional set-up at national, provincial and district level to deal with climate change, the policies that have been formulated in this regard, and budgetary allocations. The final chapter ‘Key Recommendations and Conclusion’ consolidates the research findings to answer perhaps the key underlying question in this study: what are the drivers of vulnerability and how can these be addressed? It includes a number of gender-specific recommendations for DRR/climate change policies and programs.

Gender has not been considered in a separate chapter because this is a strong cross-cutting theme across the report: chapter two details the measures taken to ensure women’s representation in the study; chapter three gives disaggregated VCI findings by male and female headed households as well as from other qualitative research techniques, notably focus group discussions (conducted separately for men and women); chapter four presents findings on health, nutrition, etc.; chapter five similarly highlights differences in perceptions and coping strategies on the part of men and women, and chapter six looks at how gender is addressed in policies, while chapter seven analyses the relationship between gender and vulnerability and makes gender-specific policy recommendations. Finally, a number of individual stories and personal quotes are given in each chapter to provide a ‘human dimension’ to the findings that have been presented: many of these are stories of/quotes from women.

## NOTES:

- <sup>1</sup> Carbon is one of the main greenhouse gases that traps the long wave solar radiation reflected back from the planetary surface, to make the Earth's surface temperature much warmer than it would be otherwise (15°C at present, which would be -18°C without the Greenhouse effect).
- <sup>2</sup> Wescoat (1991) cautioned in the early days of climate change research, the high science of scenario assessment is unlikely to resonate with the decision makers and populations of the Indus Basin where the vulnerabilities are more urgent and the decision horizon more focused on the present than the future.
- <sup>3</sup> Hulme (2009) reminded us that high science of climate may seem convincing near the centers of global power, where climate science knowledge is generated, but climate delinked from its cultural context is unlikely to travel across spaces to influence changes in behavior, that it is intended to.



# Methodology and Framework

The research study was conducted in four districts of Sindh – Badin, Dadu, Tharparkar and Thatta - using a mixture of quantitative and qualitative techniques, including household and community surveys, focus group discussions and key informant interviews. Vulnerability was assessed using the Vulnerability and Capacities Index (VCI), a tool that looks at material, institutional and attitudinal drivers of vulnerability. Particular stress was placed on ensuring representation of women in field research.

## **Vulnerability and Capacities Index**

Social vulnerability, as discussed above, is a very important concept for understanding *who* is most likely to suffer from adverse effects of environmental extremes and climate change, and *why*. There are different indices for measuring vulnerability. This research study uses the Vulnerability and Capacities Index (VCI) (Mustafa *et al.* 2010) (see Box 2.1). The VCI identifies twelve drivers of vulnerability, which are divided into three categories:

- material - individual assets, livelihoods, education, and exposure to hazard;
- institutional - e.g. social networks, extra-local kinship ties, infrastructure, warning systems, employment and minority status;
- attitudinal vulnerability - knowledge and empowerment.

The VCI was chosen over other vulnerability indices for a number of reasons: one, the architecture of the VCI is simple and analytically encompasses three important dimensions of vulnerability (material, institutional and attitudinal). Two, it provides a robust comparative metric of vulnerability that is easy to understand. Three, it is a peer reviewed and field-tested tool that therefore has academic credibility (see Box 2.1 for full discussion).

Weights assigned to material, institutional and attitudinal vulnerabilities are 35, 50 and 15 respectively. The maximum VCI score is 100. While the weightages of the three categories are fixed, there is flexibility in assigning weightages to the variables within each category. Annexure A-1 gives summary tables of the rural household level VCI used to do the vulnerability scoring, and the rural community level VCI. As an example, Table 2.1 below shows how the score for one variable, income source (under the material category), is calculated:

**Table 2.1:** Calculation of score for indicator ‘Income Source’

Indicator	Vul.	Cap.
<b>Income Source:</b> start value	<b>10</b>	
Start Value represents 100% dependency on a local level productive asset (for example, fisheries, land, small shops).		
Add 2 to the score if the income sources are unstable (for example, daily labour).	<b>+2</b>	
Subtract 2 if the local income sources are stable and insensitive to local hazards.		<b>-2</b>
Lower score by 1 for every 10% of non-local income reported		<b>-1 per</b>

The weights assignment to each of the variables for this study were based upon theoretically informed judgments on their contribution to vulnerability, and on consultations with field researchers and study managers. These variables were incorporated in the household and community survey questionnaires<sup>1</sup>. The quantitative data from the household and community surveys together with some information from key informant interviews and focus group discussions (FGDs) were used to calculate the VCIs at community and household levels.

**Box 2.1:** Background and advantages of VCI

Assessing social vulnerability is important to identify who is likely to be most affected by climate change. Most of the social vulnerability research in the past has been based upon qualitative research presented as narratives to capture the nuances, complexities and inter-linkages of factors contributing to differential patterns of damage. In the policy world, however, it is very rare for textual material to be the basis for action. Most decision makers are looking for concise preferably quantitative information, which can be generalized over larger populations and can help ranking and prioritizing populations and activities respectively.

Towards that end Mustafa et al. 2010 formulated a theoretically driven but empirically informed quantitative Vulnerabilities and Capacities Index (VCI), which could be used to capture household and community level vulnerability profiles. The index identifies twelve drivers of vulnerability, which are divided into three categories following Anderson and Woodrow (1989) into material (individual assets, livelihoods, education, and exposure to hazard), institutional (e.g., social networks, extra-local kinship ties, infrastructure, warning system, employment and minority status) and attitudinal (knowledge and empowerment) vulnerabilities. The original formulation of Vulnerabilities and Capacities Matrix by Anderson and Woodrow (1989) is one of the most commonly used instruments for qualitative participatory vulnerability assessments across the global South (e.g., see Action Aid 2005), and therefore, the VCI builds upon the strengths of this tested instrument.

The twelve drivers of vulnerability, which are a part of the architecture of the VCI, are identified based upon their significance in the vulnerability literature. Whilst the universe of vulnerability drivers is practically infinite, the assumption of the VCI is that the twelve drivers that are part of it will explain a preponderance of the variance in household and community level vulnerability.

There is a proliferation of vulnerability indices making the rounds, but this is one of the few instruments, which has been peer reviewed and therefore has the affirmation of the academic vulnerability research community that the claims made on its behalf are in fact, based upon requisite research literature and evidence. Accordingly, SPDC chose to empirically test this instrument for its vulnerability assessment exercise.

It is important to note that VCI is a tool for *comparative* analysis rather than an absolute indicator of vulnerability. A higher VCI score would mean a higher level of vulnerability and vice versa. However, while interpreting the results of the VCI survey the following constraints must be borne in mind:

- Vulnerability is a dynamic process but the VCI score can only capture a snapshot in time of the state of vulnerability;
- VCI categories and weightages thereof are based upon the South Asian experience. Some of the categories and weightages thereof may have to be modified for different contexts.
- VCI scores are for comparative purposes. The score by itself does not mean anything. Therefore, it is important that there is consistency in applying the weightages across field sites.
- VCI's simplicity and ease of use is its strength but could also be a weakness in the sense that it will inevitably miss some interlinkages and nuances of the drivers of vulnerability.
- VCI scores are meant to be used in conjunction with narrative/qualitative vulnerability analysis, not instead of them. Sometimes, there may be a temptation to dispense with the qualitative analysis altogether, which must be resisted.

The above limitations notwithstanding, VCI scores can provide a simplified snapshot of differential vulnerability that can be an invaluable tool for action. Even the limitation of interpreting the VCI scores by themselves can only *partially* be overcome with a big enough sample by running appropriate statistical routines to classify the data to identify groups of high, medium, low and resilient populations. One such routine used in the case of this study, Jenk's Natural Breaks Optimization method, is particularly appropriate for classifying the VCI data. Jenk's method is a data clustering method that classifies the data by maximizing the variance between categories and minimizing the variance within categories. Based upon a numerically high enough number of observations, one could derive categories through the Jenk's method to make confident enough predictions for the boundaries of extreme, very high, high, moderate, low, and resilient levels of vulnerability. Such an exercise was undertaken in the case of the data from this study (see Chapter 3).



## Methodology

The field methodology adopted consisted of both qualitative and quantitative techniques. Key tools for primary data collection included community and household surveys, focus group discussions (FGD), shared learning dialogues (SLDs) and key informants' interviews (KII).

**a) Community and Household Survey:** The household survey looked at members of the household, formal education, labour force participation, household income and expenditure, housing conditions, assets, agricultural and non-agricultural land, social capital and empowerment, climate change, hazard awareness, and adaptation and mitigation. In the case of female respondents, the survey looked at their activity profile (how they spend their time). The community questionnaire was designed to obtain information about the socio-economic profile of the surveyed localities, and covered topography, infrastructure and social services.

The village was the primary sampling unit used for this study. With the help of local partner organizations, key informants, and available secondary data, rural Union Councils were divided into two categories: (a) Union Councils that are more prone to disasters, and (b) Union Councils that are less prone to disasters. Historical data of the incidence and frequency of disasters was also used for classification of localities. Two-thirds of the sample villages was drawn from category 'A', and one-third of the sample from category 'B'. Using the Population Census Organization (PCO) District Census Reports, villages were randomly selected from each category. A total of 62 villages were selected with district-wise and agro-ecological zone wise distribution as shown in Table 2.2 [see Annexure A-2 for full list].

**Table 2.2:** Number of villages included in the study by agro-ecological/livelihood zone

	Badin	Dadu	Tharparkar	Thatta	Total
Canal Irrigated (fresh groundwater)	2	5	0	4	11
Canal Irrigated (saline groundwater)	12	7	2	8	29
Agro-pastoral	0	3	13	0	16
Fishing	1	2	0	3	6
<b>Total</b>	<b>15</b>	<b>17</b>	<b>15</b>	<b>15</b>	<b>62</b>

Within each village around 20 households were randomly selected for inclusion in the survey. Two adult members from each household, one male and one female, were interviewed to ensure sex-disaggregated



**Figure 2.1:** Interviews being conducted with male and female respondents.

data (Figure 2.1). Again, in order to capture the gender dimension of social vulnerability, sample households were divided into male headed households (MHHs) and female headed households (FHHs). Out of a total sample of 1,259 households, 1,102 were MHHs and 157 were FHHs. Table 2.3 gives the breakdown of households surveyed by village and agro-ecological/livelihood zone:

**Table 2.3:** Number of households included in the study

	Badin	Dadu	Tharparkar	Thatta	Total
Canal Irrigated (fresh groundwater)	40	102	0	80	222
Canal Irrigated (saline groundwater)	241	146	41	162	590
Agro-pastoral	0	61	266	0	327
Fishing	20	41	0	59	120
<b>Total</b>	<b>301</b>	<b>350</b>	<b>307</b>	<b>301</b>	<b>1259</b>

**b) Focus Group Discussions (FGD):** These were conducted to elicit information on men’s and women’s perceptions of climate variability, sources of livelihoods, exposure to environmental hazards, coping/adaptation strategies, social networks, warning systems and empowerment. Checklists were developed to guide the discussions. Separate male and female FGDs were conducted in each village to ensure that gender dimensions of vulnerability were captured. A total of 56 male FGDs and 56 female FGDs were conducted.

**c) Shared Learning Dialogues (SLD):** Multi-stakeholder dialogues were conducted in each district involving representatives from local government, community organisations, researchers and scientists. On average, a total of 10-12 participants took place in each dialogue [See Annexure A-3 for list of participants]. A discussion was conducted which covered the parameters of social vulnerability in the districts, and the impacts of climate change, including gender-differentiated impacts. Views from the different groups were also sought on existing programmes and strategies to reduce disaster related risks. These dialogues helped in the development of questionnaires for both the household and community surveys.

**d) Key Informant Interviews (KII):** Detailed interviews with key informants were conducted to inform the institutional analysis. Officials of district and provincial governments, local community leaders and notables, and development practitioners were interviewed [See Annexure A-4 for list of interviewees].

## **Geographic Scope**

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Sindh has been particularly vulnerable to climate change: it was the most affected province during the 2010 floods and large areas remain prone to high water stress, salinity, desertification, drought, floods and cyclones. The four study districts—Badin, Dadu, Tharparkar and Thatta, were selected based on a number of factors, e.g., experience of changes in environmental conditions; vulnerability to floods and droughts; diverse agro-ecological zones; diverse sources of livelihood, including agriculture, livestock and fishing; low human development indicators; gaps in gender specific research; availability of secondary information; willingness and interest on the part of both government and communities; security and access.

A brief profile of each district, focusing on topography and climate change impact, is given below: [See Annexure A-5 for full profiles.]

**a) District Tharparkar:** Tharparkar district is located in the Thar desert to the east of Sindh province.<sup>2</sup> The district consists of barren tracts of sand dunes covered with thorny shrubs. The climate is of a tropical desert, with extreme heat in the summer and cold winters. In arid and semi arid regions, the effects of climate change are particularly severe because these areas are particularly vulnerable to changes in temperature, evaporation, and precipitation variability.<sup>3</sup> Water is a major issue: in most parts of the district people consume brackish water. Agriculture and livestock are the main sources of livelihood, and

both depend on the amount of rainfall, which is erratic and irregular. The district has been hit periodically by droughts, with the most recent in 2013-14.<sup>4</sup> Reduced rainfall leads to soil and land erosion, reduction in vegetation, and thus to less fodder for livestock and food shortages.

**b) District Badin:** The southern part of Badin district is close to the delta of the River Indus, and the eastern part is connected with the sand dunes of Tharparkar. The water table has a depth of 240 cm in winter, and 150 cm in summer, and the drainage system is inadequate. As a result, even a nominal increase in rainfall leads to flooding. Rainfall is erratic and unpredictable, and since the Indus Delta is a low lying area it bears the full brunt of the south west monsoon.<sup>5</sup> Sea intrusion and drainage from the Left Bank Outfall Drain<sup>6</sup> (LBOD) have led to excessive water logging and salinity, affected land and agriculture, and subsequently the livelihoods of the people. Salinity is greater in the southern part of Badin, and a mass migration of fishermen has taken place for the last thirty years, which has ruined once prosperous communities.<sup>7</sup>

**c) District Thatta:** Thatta district is a low-lying area located about 60 miles from Karachi.<sup>8</sup> Since Thatta is at the tail end of the River Indus it faces constant water shortages, partially because of excessive upstream withdrawals, which threaten agriculture and livelihoods.<sup>9</sup> The lack of fresh water to recharge the ground water aquifers and sea intrusion, has led to rising salt content in the soil, which has risen to the surface, killing vegetation, making the land unfit for cultivation or growing natural grasses. This has led to destruction of agricultural land, a drastic reduction in yield per acre of various crops, and what were once grazing grounds becoming uncultivable wastelands. Sea intrusion coupled with rising sea levels has led to flooding and erosion of coastal areas, affecting fishermen. Thatta is also vulnerable to other natural disasters such as cyclones and droughts.<sup>10</sup> Finally, it is among the poorest districts in Pakistan, especially its coastal areas.

**d) District Dadu:** District Dadu is located in the south-west of Sindh bordering Balochistan. Climatic conditions in the district are considered as extreme; intensively hot in summer and moderately cold in winter. There are three distinct topographic areas: hilly, irrigated, and low lying riverine land. Average rainfall is 120 mm, and the main source of water is the River Indus. The district is prone to natural disasters including floods (due to hill torrents, heavy rains and flooding in the River Indus) and droughts. The main sources of livelihood are agriculture and livestock.

## Analytical Framework

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While the field research for the study was carried out in four districts on the basis of administrative boundaries – roughly 300 households per district – the analytical framework is based on agro-ecological/livelihood zones. There are four main agro-ecological zones / livelihoods in the target areas:

- canal irrigated with fresh groundwater;
- canal irrigated with saline groundwater;
- agro-pastoral;
- fishing

The canal irrigated villages are divided into two zones, the ones with fresh and the other with saline groundwater respectively. The villages with fresh groundwater have the choice of supplementing inherently scarce canal water with groundwater irrigation, while the villages with saline groundwater do not. This is important in terms of choice of crops and sustainability of livelihoods between the two zones, and hence the distinction. In Sindh the non-canal irrigated regions are invariably based upon pastoral or agro-pastoral livelihood systems. This classification captures the issues of villages in those categories. Finally the category of riverine and estuarine fishing communities captures the vulnerability profile of these much neglected communities within this eco-livelihood system.

The findings of the study – VCI findings, views expressed in FGDs and SLDs, the non-VCI data to emerge from community and household surveys, etc – have been organized on the basis of the four zones listed above. This approach has two main advantages over presenting the findings organized by district. One, the experience and issues faced by fishing communities will largely be the same in Badin as in Thatta and Tharparkar; by merging them together a lot of repetition is avoided. Two, presenting the findings based on agro-ecological zones will provide far more useful learning for other countries/regions facing similar challenges. For the intended global audience for this study, administrative boundaries are largely meaningless. Conversely, of course, district-wise findings will be of great interest to the domestic audience, particularly to provincial and district level policy-makers. However, this need will be addressed through district reports prepared by SPDC to be published separately.

## **Ethical Considerations, Constraints and Challenges**

Ethical considerations have been taken into account at every stage of the research study. Ethical guidelines were prepared at the inception stage of the project and staff were trained in these. Key ethical considerations included:

- Procedures were adopted to ensure that all participants (interviewees, community and household members) understood the process in which they were engaged and they gave voluntary and informed consent. As well as sending out introductory letters to respondents explaining the research objectives and seeking their consent, this was repeated at the time of conducting interviews/surveys.
- It was made clear to participants that they could withdraw from the study, and that it was not binding on them to provide information or respond to the questions being asked.
- Efforts were made to safeguard confidentiality of information. The respondents were assured that the information provided by them (at household level) will only be used for the purpose of analysis. No specific information (related to individuals) will be made public. However, it was also explained that if they gave an opinion their name might be quoted in the report. As far as possible interviews were recorded (with participants' consent) to avoid any misinterpretation.

The constraints of the VCI were explained above. Wider constraints of the research study are the lack of gender disaggregated secondary data on disasters. A number of challenges were faced, particularly in conducting the field research. These included: difficulty in accessing districts due to recurring floods; diversion of attention of both communities and officials to relief and reconstruction; lack of authentic data on climate and agricultural production over the required period of time (30-40 years); lack of personnel willing to travel to such remote places, especially in extremely hot weather; and difficulty in sifting information on changes due to climate change from other factors such as poorly maintained irrigation infrastructure, poor farming and water management practices, degradation of natural ecosystems and lack of overall development. Various strategies were adopted to overcome these challenges, e.g. having a flexible approach to setting timings for field research and doing so in consultation with local people; recruiting

field enumerators and surveyors from within organizations already working in the target districts and training them; developing partnerships with research institutions to ensure access to relevant material; and developing specific criteria to probe the impacts due to climate change.

### **NOTES:**

1. All survey instruments of this study including household and community questionnaires and FGDs checklists are available on request from SPDC (email: spdc@spdc.org.pk).
2. Pakistan Emergency Situation Analysis. District Tharparkar April 2013.
3. Gender and Climate Change: An Introduction, Edited by Irene Dankelman, Earthscan 2010.
4. Tharparkar Drought 2014, Jaggarta Social Welfare Organisation.
5. Ibid.
6. Down the Drain by Gulmina Bilal Ahmed, Newsline, 5th February 2007.
7. 'The Sea May Swallow Thatta, Badin, and Sujawal, in 30 years'. The News, 6 June 2014. According to one estimate 3.5 million acres of arable land have been inundated by the sea in three districts of Sindh, Thatta, Badin and Sujawal. And 800,000 fishermen from these areas have been forced to shift to different parts of the country.
8. Effects of Climate Change on Thatta and Badin. Sami Khan. Envirocivil.com. January 25, 2012.
9. Ibid.
10. Disaster Risk Management Plan District Thatta Government of Sindh 2008.



# 3

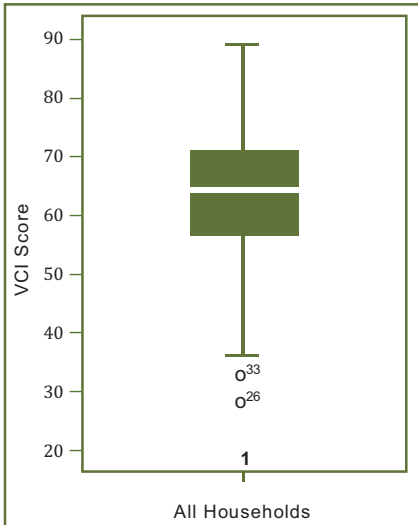
## Vulnerability and Capacity Analysis

This research study is probably one of the most extensive field tests of the VCI undertaken so far. As mentioned in Chapter 2, VCI is not meant to be a substitute for qualitative vulnerability analysis but rather a complement to them. Hence, the discussion of VCI results in this chapter is in tandem with the information gathered through key informant interviews, focus group discussions and participant observations. Throughout the chapter, as the VCI results are presented, it is stressed that the scores are a static generalization of a complex and changing reality. The static snapshots of vulnerability can, however, provide the type of generalized actionable information, which can be the basis for deeper inquiry and directing interventions.

This chapter presents the VCI results from 1,259 households in 62 villages, across four agro-ecological zones/livelihood types. In the first instance, a few representative household level VCI scores are presented and deconstructed to illustrate how they were derived. Furthermore, some additional information is also presented about those representative households to further validate the scores. The same process is repeated for community level VCIs. The VCIs across agro-ecological zones are then compared, supplemented with qualitative data from other sources. Some general insights about vulnerability profiles across the agro-ecological zones/livelihood types are offered based upon the analysis. Lastly, and most importantly the VCI scores are cross referenced with the qualitative information to tease out disconnects between VCI scores and gendered vulnerabilities. Concluding reflections upon disconnects illuminate the possible points of leverage and interventions to address the gendered vulnerabilities.



## Vulnerability Profile of the Study Communities and Households



**Figure 3.1:** The box plot for the overall sample showing the distribution of the observations.

Before delving into the details of the vulnerability profile of the study communities based upon the VCI analysis, it would be useful to stipulate a few notes on interpreting the data statistics that are presented in this chapter and through the report. The overall distribution of VCI scores, their descriptive statistics, such as mean, median and mode are presented. As per the popular prejudice, there may just be the temptation to privilege the means of the data being presented. That would be a mistake. The whole notion of climate change, at its core is about moving away from normal, mean conditions based thinking and planning paradigms. Therefore, the key statistic that is highlighted is the modal distribution of vulnerabilities across the overall sample, agro-ecological zones and study communities.

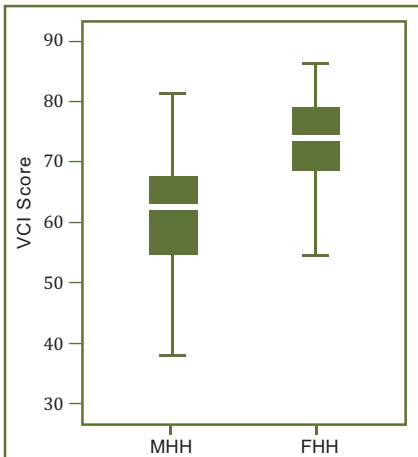
**Table 3.1:** Basic statistics for the overall sample population

Statistic	Value
N (Valid)	1259
Mean	63.94
Median	63.78
Mode	63
Std. Deviation	9.668
Variance	93.462
Range	63
Minimum	26
Maximum	89

Table 3.1 presents the basic descriptive statistics for the overall sample of households, while Figure 3.1 is a box plot demonstrating the overall spread of the VCI scores for the sample.

According to the Shapiro-Wilke test of normality and the convergence between mean, median and mode, the overall VCI data is normally distributed. The important point here is that the modal distribution is 63, and the mean

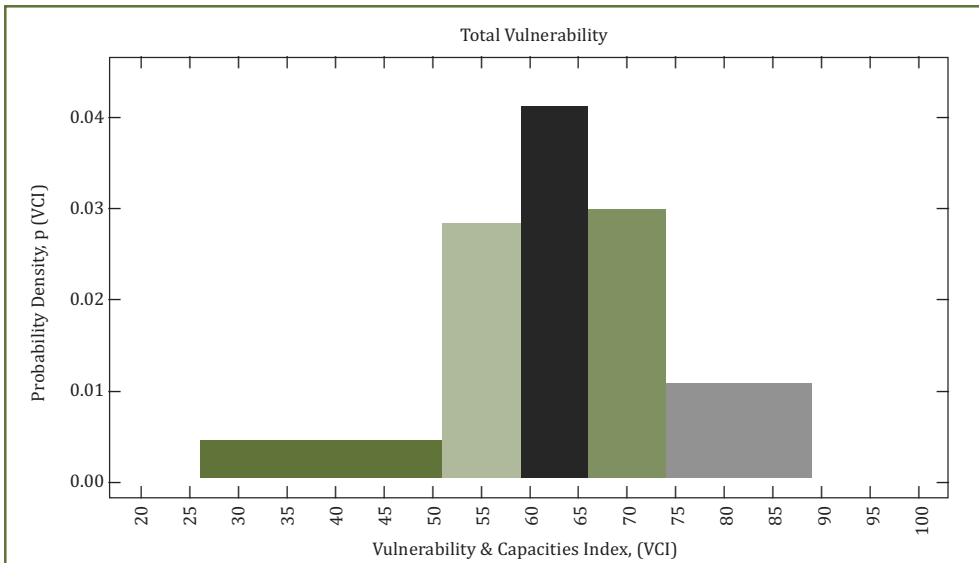
distribution is 63.94. The sample also has a reasonable spread of 63 points with a minimum score of 26 and a maximum score of 89. It should also be noted that there is a significant difference in the VCI scores between female and male headed households. Table 3.2 lists the differences between male and female headed household.



**Figure 3.2:** Box plots for male and female headed households.

**Table 3.2:** Household statistics disaggregated by male and female headed households

	Mean	Mode	N	Std. Deviation
<b>All Household Level VCI (HH VCI)</b>				
Male Headed Households	62.41	63	1102	8.905
Female Headed Households	74.63	79	157	7.908
Total	63.94	63	1259	9.668



**Figure 3.3:** Distribution of categories—resilient, low, moderate, high, very high and extreme vulnerability.

A Jenk’s maximizing variance routine was conducted on the overall data to get some sense of the natural breaks in it. The results of the routine are outlined in Figure 3.3.

Jenk’s routine minimizes the variance within the category and maximizes it between categories. There are five categories shown in Figure 3.3, but we divide the data into six categories, with the score of 38 defining the boundary between resilient and low vulnerability categories. There are two outliers in the low vulnerability category, therefore the boundary is drawn at 38, above which are the rest of the observations. Below that number we deem the scores to represent resilience. The VCI score boundaries for the categories therefore are as follows:

- Resilient 0-37
- Low Vulnerability 38-50
- Moderate Vulnerability 51-59
- High Vulnerability 60-66
- Very High Vulnerability 67-74
- Extreme Vulnerability 75 and above

Since VCI is a comparative number, it is important that these empirically derived numbers be used to determine some generalized classification of low, medium, high, very high and extreme levels of vulnerability. Such an empirically derived global classification can provide a further simplified tool for a policy maker to interpret the

results of any VCI exercise. The sample of 1,259 is big enough for deriving statistically robust boundaries between the categories. The categories are likely to become more robust with bigger samples, but given the sample size and the rigor of the sampling, it is not anticipated that the actual boundaries will vary significantly. The remainder of the VCI scores presented in this report should be interpreted with these categories in mind.

### **Authenticating Household Level VCIs**

In terms of the household VCI scores the case of Fehmida<sup>1</sup>, an illiterate widow from the coastal fishing village of Hashim Mandrio in district Thatta, is illustrative. Her VCI score is 86, which is in the very high vulnerability category according to the Jenk's classification routine. This is a female headed household in which Fehmida lives by herself as all her daughters are married. Her house is highly exposed to coastal flooding, an attribute that she shares with the rest of her village, though there is a considerable range of vulnerabilities in this village, with the lowest VCI score of 50. She did not report kinship or associational ties which could be a source of help and assistance to her in the event of an emergency. Indeed, she is almost entirely dependent upon the larger community for her food and shelter. This is a heartrending case of gendered vulnerability where, despite having adult daughters, she does not think that they can be a source of solace or help to her. Because of the particular patriarchal ethos of rural Sindh it is considered quite shameful to call upon female offspring for any kind of help or support. Furthermore, it would most likely be impossible for her daughters to support their mother, because of their own dependent situation on their husbands' households.

Whilst Fehmida is alone and dependent upon the community's largesse for her upkeep, Bhago is an 80 year old illiterate widow from the agro-pastoralist village of Mondro in district Tharparkar with a house full of children and grandchildren, but still has a household VCI of 84. Her 46 year old son is in prison and hence unable to provide for the family. She lives in a traditional *Chora* structure<sup>2</sup> (Figure 3.4) with her 45 year old daughter-in-law and four grandchildren all below the age of 14. Nobody in her household has ever had formal schooling. Her daughter-in-law is a daily wage worker and a livestock trader. Her oldest grandson, aged 14, manages livestock for local landlords and makes some money that way. Her granddaughter, aged 12, does embroidery work which is a source of some income. Bhago is also like Fehmida above, a recipient of income from the Benazir Income Support

Programme (BISP) as well as benefitting from her community's largesse. The household is not aware of any warning system, has no extra kinship ties or associational membership. They have no anticipation of help from any quarter in the event of a disaster. They have no access to any infrastructure, e.g., mobile phones, electricity, sanitation. Furthermore, the household is perpetually indebted even just on account of food expenses.



**Figure 3.4:** A women sitting in traditional housing structure (*chora*).

Whilst almost all the extremely vulnerable households are female headed, there are instances of male headed extremely vulnerable households. Mahmud from the coastal island fishing village of Ghulam Dhablo in Union Council Ketu Bandar, district Thatta, heads one such household. He is a young man of 25 with a 23 year old wife and three minor children. The wife is a full-time home maker while Mahmud is a fisherman who reports having to go further and further - up to 90 km from the coast - to find fish, whereas in the past he just used to fish locally. He owns his fishing boat and a net, and those are about his only assets. He and his community have no access to modern or indeed any infrastructure, but what particularly distinguishes him is his lack of extra local kinship ties, associational life or access to any leadership structures at any scale. Being the sole breadwinner living on a highly exposed island and engaged in a somewhat dangerous profession, his family is perpetually living on a knife's edge. Overall his community is highly vulnerable (minimum score 60), but what makes him particularly vulnerable is his lack of social capital and lack of access to

the protection of a larger family. Although this cannot be confirmed, but given the atypical closeness in the ages of his wife and himself and his nuclear family, one could safely surmise that he is probably estranged from the larger community because of marriage without his family/community's consent. Here again, possibly the question of personal choices bears upon the vulnerability of this household.

On the lower end of the spectrum, Abdul Rahim from village Khat Lashkar in district Dadu has a VCI score of 40. Khat Lashkar is a canal irrigated village with fresh groundwater. Khat Lashkar is overall a less vulnerable community and Rahim is one of the least vulnerable members of that community. Rahim lives with his three brothers, a wife and mother. His wife has a college education and the mother is also educated. He has a government job as a stenographer in Karachi, while one of his brothers has an agricultural income, and the other two are unemployed. The household is well equipped with electrical appliances, e.g. a refrigerator, television, and flat iron, and they own a motorbike for transportation. The household did not report any associational membership, or extra local kinship ties, but they did report good linkages to community and local leadership structures.

In the agro-pastoralist village of Dondio Meghwar, in district Tharparkar, Baghia (with VCI score of 38) is a 67 year old patriarch of a household comprising his three sons (ages 35, 23 and 20 years), two daughters (ages 20 and 15 years), two daughters-in-law (ages 28 and 25 years), four grandsons (ages 8, 5, 3 and under one year) and two granddaughters (ages 3 and 9 years). Both he and his eldest son have had 13 years of schooling while the other two sons had completed 9 and 12 years of schooling respectively. The two daughters-in-law as well as the matriarch of the family were illiterate. The two daughters had two years of schooling, while one of the grandchildren who was old enough was in the 1st grade. Baghia cultivates his own land, while his sons earn from government service, livestock business and a grocery store respectively. The daughters and the daughters-in-law also bring in income from their embroidery work. The family lives in a six room house with a cement roof and burned brick walls. The family uses firewood for fuel, and use a pit latrine. They also have a mobile phone connection. While the men reported an active associational life, engaged with the local community based organization, the women reported no such associations. Furthermore, the men considered themselves close to local leadership structures and had awareness of a disaster warning system that they trusted. Women were aware of no such warning system. Here again, a seemingly less vulnerable

household has hidden dimensions of gendered vulnerability, where women are simply not aware of any warning systems and are dependent upon the men in the family for timely warning, information and support.

While the above sample household studies can validate the types of VCI scores derived from the survey, they also caution against over reliance on these scores for assessing gendered vulnerability. The VCI does a competent job of capturing gendered vulnerability at the higher end of the spectrum. But at the lower end, the scores can often obfuscate higher gendered vulnerability within households. This point will be thrown into sharper relief as the VCI scores at household level are validated.

### **Authenticating Community Level VCIs**

The 62 village communities included in the survey were assessed for their collective VCI scores by aggregating the 20 household level VCIs calculated in each of the villages and by using the rural community based VCI table shown in Annexure A-1. The rural community VCI is an instrument for rapid assessment of VCI when the time and resources are not available to undertake a household level VCI assessment exercise. This project provided an important opportunity for testing the linkages between aggregated household level VCIs and the directly calculated community based VCI scores. Pearson’s correlation tests were conducted on the aggregated household VCI scores for communities and the community level VCI scores. The results of the Pearson’s correlation are listed in Table 3.3.

**Table 3.3:** Pearson’s correlation results for comparison between community VCI and aggregated household VCIs for communities

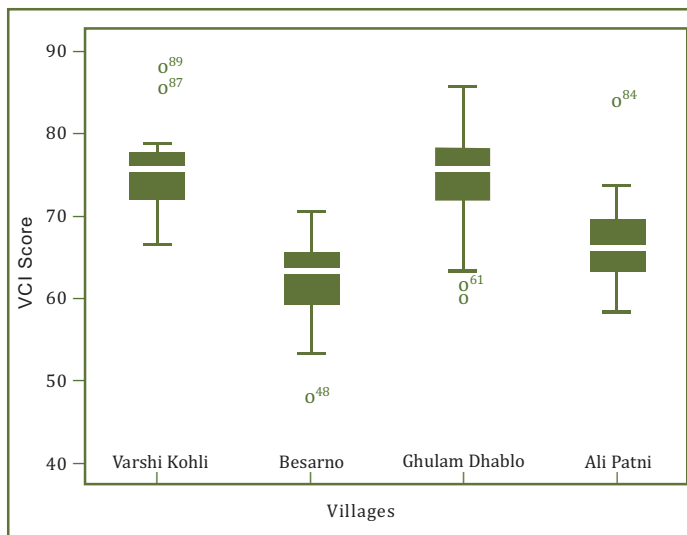
		<b>Community VCI</b>	<b>ALL HH VCI</b>
<b>Community VCI</b>	Pearson Correlation	1	.603
	Sig. (2-tailed)		.000
	N	62	62
<b>ALL HH VCI</b>	Pearson Correlation	.603	1
	Sig. (2-tailed)	.000	
	N	62	1259

Table 3.3 illustrates that community level VCIs (Community VCI) are significantly correlated with the aggregated household VCIs for communities (ALL HH VCI) at more than 99% confidence level (Sig. 2 tailed = .000). The correlation is, however, weak, explaining only 36%

of the variance (test statistic = 0.603). Therefore the community VCI can be used in lieu of a household level VCI assessment exercise to get an approximation of the overall vulnerability profile of the community. However, the community itself at times can have large variations in vulnerability within it, rendering the community level VCI score a weak generalization. The community level VCI could be a strong generalization where the spread of VCI scores within the community is small. Table 3.4 lists the communities that are profiled in detail in this section to validate the community VCI scores. Figure 3.5 gives the box plots of the household level VCI scores for the same communities.

**Table 3.4:** Community VCI and aggregate household VCI scores for selected communities

Village	Zone	Comm.	HH. Mean	HH. Mode	HH. Min	HH. Max
Ghulam Dhablo	Fishing	70	74	73	60	85
Besarno	Agro-Pastoralist	57	62	63	48	70
Ali Patni	Irrigated-Fresh GW	65	67	63	58	84
Varshi Kohli	Irrigated-Saline GW	73	74	75	66	89



**Figure 3.5:** Box plots for the HH VCI scores for the villages Varshi Kohli, Besarno, Ghulam Dhablo and Ali Patni.

The village Ghulam Dhablo is an island in the Keti Bandar creek (Figure 3.6), district Thatta. Being a coastal island it is highly exposed to tropical cyclones and marine flooding. The village has virtually no modern infrastructure, e.g., roads, electricity, schools, hospitals or water supply system. Drinking water is brought into the village by boats from Keti Bandar Port, so if the connection with the main town is temporarily severed in the event of a coastal storm, the approximately 400 people in the village would not even have drinking water. The nearest government funded boys' and girls' schools are about 90 km from the village on the mainland, as are

any basic health units with a qualified physician. A hospital for any major illnesses is about 150 km away. Almost all the residents of this village are engaged in fishing and are progressively having to travel longer and longer distances chasing after dwindling fish stock. The reasons for the dwindling fish stock are many, the chief amongst them being off shore commercial fishing by foreign and domestic fishing trawlers. But unsustainable fishing techniques used by the local fishermen are not exactly helpful either. Furthermore, subsistence





**Figure 3.6:** Village Ghulam Dhablo-Thatta.

fishing is increasingly being replaced by commercial fishing even amongst local fishermen resulting in greater reliance on unsustainable fishing techniques. This fragility of the livelihood base, particularly in terms of its susceptibility to commercial exploitation and environmental degradation, is one of the main reasons that the fishing communities in the sample in particular, and in Pakistan in general, are highly vulnerable.

The VCI range of 25 with a minimum of 60 illustrates the type of high vulnerability characteristic of this community. The only thing distinguishing households with lower vulnerability from high vulnerability is the strength of the social capital that the people are able to call upon, or cases of more than one bread earner in the household. Otherwise the level of infrastructure, educational attainment and assets is generally the same across the village. In this instance the closeness between the household VCI mean and mode, and the community VCI illustrates that the community VCI is a reasonably accurate reflection of the relative vulnerability of the village.

Surrounded by sand dunes village Besarno is located in district Tharparkar, within walking distance of an all weather metalled road. The nearest town of Mubarak Tarr, with a secondary school and a basic health unit (BHU) is about 10 km away. The approximately 350 residents of the village largely live in adobe mud houses. Some of the residents of the village have employment with the military and government service; this constitutes a stable source of income for about 36% of the households. Although there is no electricity in the village, there is a boys'





**Figure 3.7:** Guar is a major food crop in Tharparkar.

primary school and three deep wells that are the source of fresh drinking water for the residents. The low modal HH VCI score of the village, with the highest score of 70 and a small VCI score range of 22, is indicative of the lower vulnerability of the village, primarily on account of the diverse income sources of the residents, and extra kinship ties of more than 50% of the residents. Many of the residents, because of a household member's employment in the government, also report having access to local leadership structures. Agricultural production in the village has been good for the past few years, though in 2013 the main crop of *guar* (cluster bean: *Cyamopsis tetragonoloba*) was spoilt because of untimely rains (Figure 3.7). That was reported to be the first instance of spoilage of a crop from untimely rains in living memory.

The canal irrigated village of Ali Patni is located in Taluka Keti Bander in district Thatta. The village is canal irrigated, though it is only 1.5 km from the sea, and consequently coastal flooding is one of its main hazards. The main sources of drinking water for the 600 residents of the village are a hand pump, and a local stream with slightly brackish, low quality drinkable water. The village does not have any electricity, schools or medical facilities. There are schools and medical facilities 5 km from the village, but most people cannot afford the transport fare for the children to travel to those schools. In addition, the motorable road is not passable during the rainy season. There is not much in terms of agricultural productivity in the village. It is at the tail end of the irrigation canal and irrigation water access is erratic at best. With land degradation from salt water intrusion and salinity, agricultural productivity is quite marginal. The extreme poverty of the village is manifest in the relatively high community VCI score of 65 and the household VCI scores ranging from a low of 58 to a high of 84.

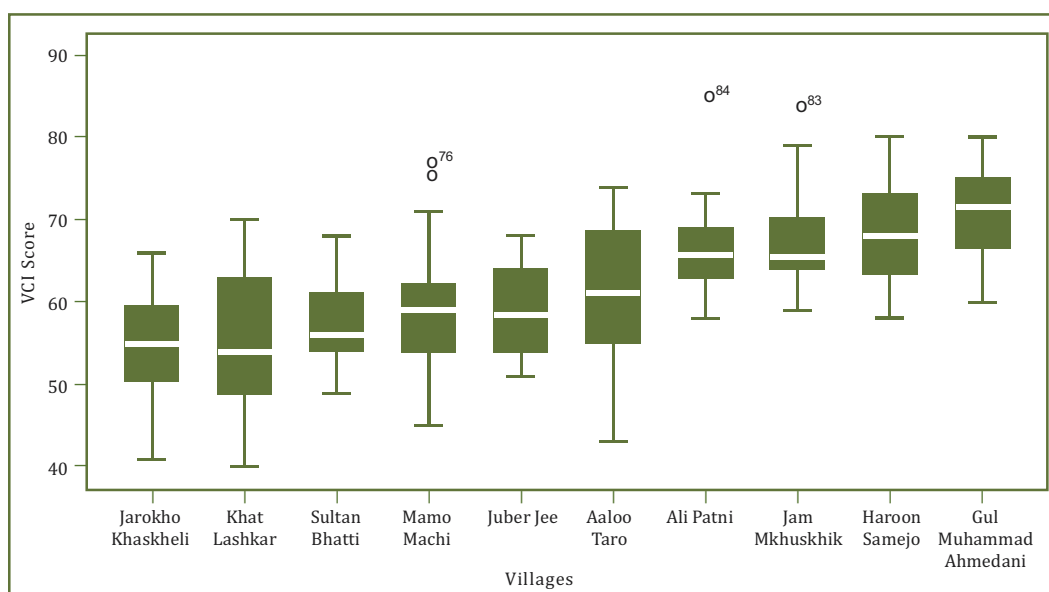
The highly vulnerable village of Varshi Kohli (community VCI of 73) is in district Badin and all of its approximately 450 residents are Hindu migrants from neighboring Nagarparker. The reason behind their migration was water scarcity in their traditional area. The village is characterized by extremes of poverty and vulnerability—the maximum VCI score being 89. Apart from a boys' primary school and a seasonal motorable road, the village has no infrastructure or facilities, e.g., electricity. The village does have some hand pumps, which are functional, but they mostly deliver brackish water. The residents of the village migrated from Nagarparker in the 1970s because of drought. The residents of the village are largely associated with day labour in the area, though some people still maintain landholdings in Nagarparker from which they derive an income. The

village is quite close to the Left Bank Outfall Drain (LBOD), which is a source of flooding for the village. Since the initial migration the entire population of the village has had to temporarily migrate back to its homeland in Nagarparker because of flooding in 1984, 1994 and 2011. Thus, ironically, while they migrated because of lack of water, they periodically have to retrace their steps because of too much water.

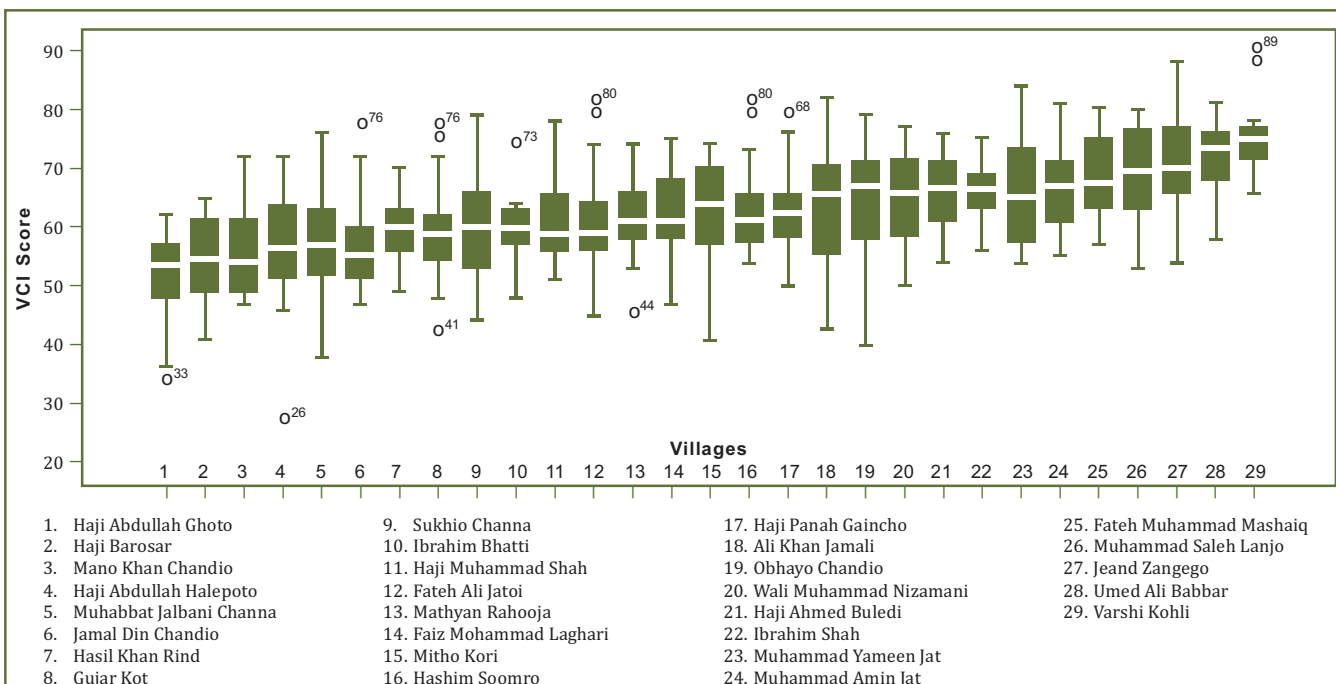
The above case studies illustrate the stories behind the community VCI scores and their correlations with the HH VCI scores. The criterion for the selection of these cases studies was the closeness of the HH VCI scores. Whilst on the one hand these case studies convey how the community VCI score can be indicative of the relative vulnerabilities of the communities, on the other hand these same case studies underline the need to go beyond the numbers to understand the specific drivers and configurations of community vulnerability. The numbers draw attention to the fact that something of interest is going on, but it is the qualitative information, which provides specific guides to action.

### Comparing Household (HH) VCIs within the Agro-Ecological Zones/Livelihoods

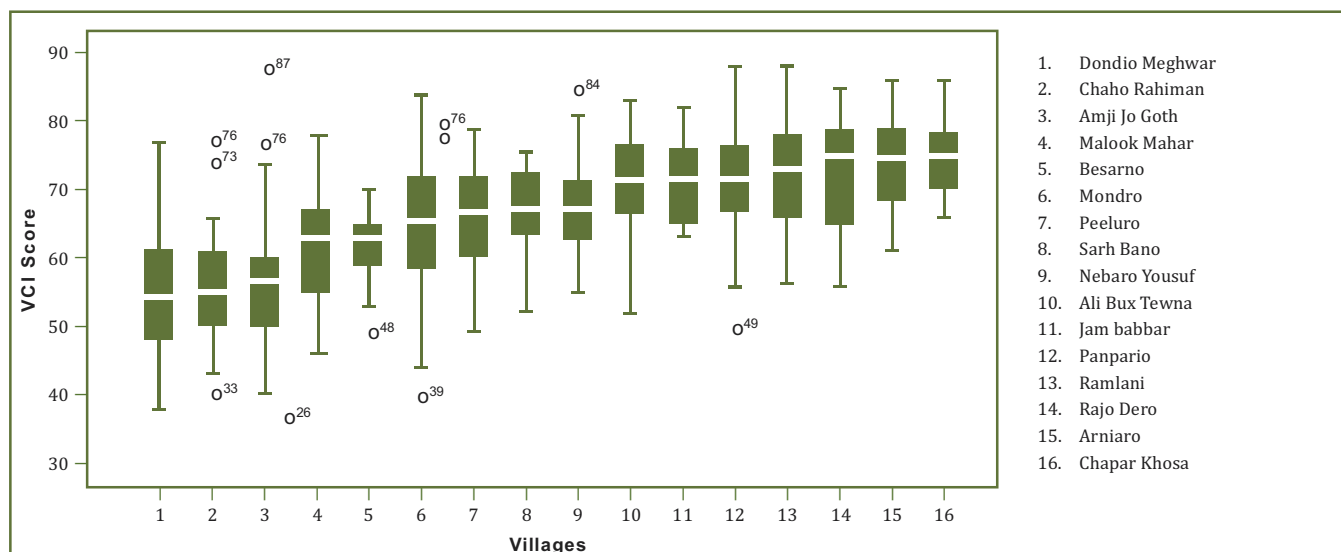
In this section the box plots are presented for household (HH) VCI scores for the entire sample of 62 communities by agro-ecological/livelihood zones. Figures 3.8 to 3.11 list the aggregated HH VCI scores of all the communities by agro-ecological/livelihood zones.



**Figure 3.8:** Box plots for household VCI scores of villages with canal irrigation and fresh groundwater.



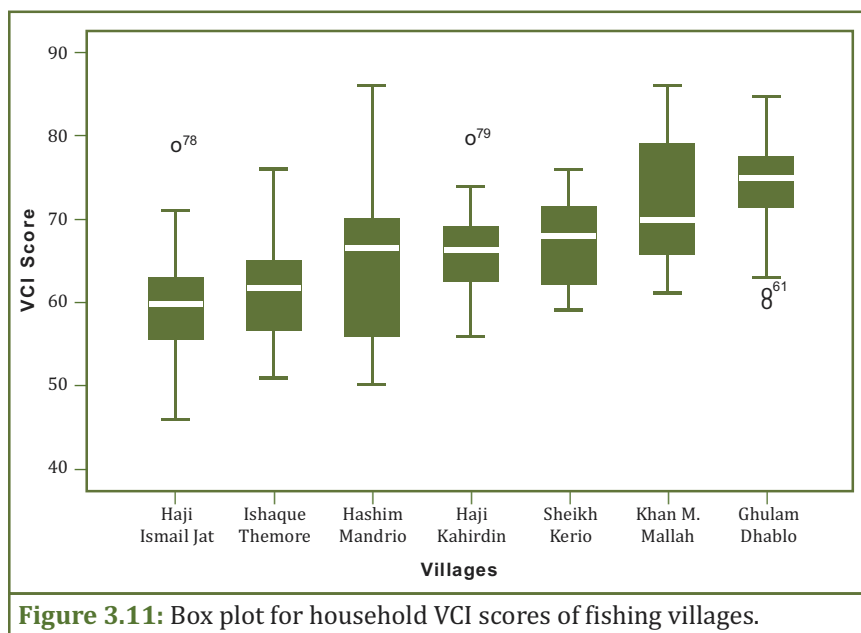
**Figure 3.9:** Box plots for household VCI scores of villages with canal irrigation and saline groundwater.



**Figure 3.10:** Box plot for household VCI scores for agro-pastoralist villages.

The HH VCI box plots are drawn in ascending average VCI scores for the villages. It is obvious from the box plots that villages have different spreads of VCI scores, thereby making any generalization about the representativeness of the mean HH VCI score for that community of variable quality, e.g., in the case of fishing villages, the mean for village Hashim Mandrio is less than half as good a representation of the data

as the mean for Ghulam Dhablo where the VCI scores are clumped together more closely. Hence, using the aggregated HH VCI scores for all the communities in each agro-ecological/livelihood zone for comparison would be much less reliable than using the community level VCI score. In other words such an aggregation would obfuscate the real diversity of the data, and give a false sense of simplicity where none exists.



Case studies of four additional villages are given here to illustrate why they fall where they do on the household vulnerability spectrum. First is the case of Haji Khair Din Mallah village on Manchar Lake in district Dadu (Figure 3.12). This is one of two villages on the lake: Haji Khair Din Mallah is on the shore, while the other, Haji Khan Muhammad Mallah, is on houseboats. The community VCI score for Haji Khair Din Mallah is 68 and HH VCI ranges from 54 to 79. The majority of people in the village previously lived on houseboats on Manchar Lake. There used to be more than 50,000 fisherfolk families living on more than 2,000 houseboats in the lake. But the actual population has now dwindled to about 100 families living on 60 houseboats primarily in Khan Muhammad Mallah village. The main cause of this decline was the construction of the Right Bank Outfall Drain (RBOD), which was a World Bank funded project to drain agricultural effluents and municipal waste from low lying lands and communities on the right bank of the River Indus to the river. The main spinal drain of the project—Main Nara Valley Drain (MNVD) dumps all of the waste into



**Figure 3.12:** A view of village Haji Khair Din Mallah located on the bank of MNVD.

Manchar Lake. Since completion of the drain the waste flowing into the lake has destroyed the fisheries and destroyed the water quality of the lake, with disastrous consequences for the community:

*Twenty years ago we were living peacefully on boats and our complete household and economic activities were on boats. But the conditions changed and some water of drains was mixed with our pure water, and gradually people were shifting to the side of “Manchar River” (Female respondent Khair Din Mallha).*

*We sold out our boats in time of need, when we could not get a livelihood from them. Now if anyone wanted to buy a boat it would be nearly impossible because it costs 2 to 3 lacs (hundred thousand) rupees. Sometimes we struggle for one meal a day when we get no fish from water. As we are Mallah/Mirbahar/Machi, we just know fishing profession only, and we have no experience or skills for any alternate profession (Female respondent Khair Din Mallah).*

*Our source of livelihood is fishing and now it is too difficult when conditions are not the same. We are in shock and sad as now fish is not that quantity and water is completely polluted (Female respondent Haji Khair Din Mallah).*

*Previously we did fishing with males in every activity at equal level and had more economic activities and had a very prosperous life (Female respondent Haji Khair Din Mallah).*

As the above quotes illustrate, not only was an entire way of life lost as a consequence of the changes brought about by the MNVD drain, but these also had deleterious consequences for gender relations in the communities. Whereas previously women were empowered by virtue of their participation in livelihood activities on an equal footing, now they are restricted to the domestic sphere.

Similar types of transformations were observed in the more prosperous and generally less vulnerable villages in the sample. Khat Lashkar, a canal irrigated village in Dadu, with fresh groundwater is one such village with a low community VCI score of 46, and a modal HH VCI score of 49, ranging between 40 and 70. The more than 2,500 residents of the village mostly live in brick and cement built housing and have access to most amenities, including schools (Figure 3.13), gas, in-house hand pumps, electricity and a motorable road, though there is no health facility. The nearest basic health unit is about 2-3 km from the village. There is a relatively high literacy rate in the village, and seemingly the



**Figure 3.13:** A girls school established by an NGO in village Khat Lashkar.

community has done all the right things in terms of male and female education. Most of the respondents from the village were college educated, engaged in the education profession, and had employment with the government and the private sector, in addition to the customary agricultural income. Moreover, this village featured relatively higher levels of educational attainment than in all of the other villages in the sample (53% of the females in the sample were educated).

Despite the stress on education and diversification of income to mitigate their vulnerability, these progressive trends had a relatively regressive aspect in terms of gender relations as illustrated by the following quotes:

*Most neighbourhood females were working in the field for agriculture, but since the past 15 to 20 years the females in our tribe have changed. Our livelihood has changed and therefore we are not working as agricultural labour . . . Now we are more religious and our males do not allow us to move about and insist that we cover with veil (Female respondent, Khat Lashkar).*

Many of the females attending the focus group discussion in this village were covered head to toe in shuttlecock style *burqa*, which is quite rare in Sindh. Apparently, with greater prosperity and education, which ostensibly contributes to lower vulnerability, there have been negative consequences for female mobility and empowerment. Such outcomes may contribute towards greater gender differentiated vulnerability, which the raw VCI score is unable to capture in this instance.



The other large village of Mano Khan Chandio in district Dadu has a population of more than 3,200. It is a canal irrigated village, with saline groundwater, though outside the village at about the distance of less than a kilometer, hand pumps are installed for drinking water. The community VCI score for the village is a relatively low 49 and the modal household VCI score is 51, with a minimum score of 47 and a high of 72. The village has had a boys' primary school since 1956, along with a motorable road, a medical dispensary, electricity, and mostly brick and cement lined housing. Many of the households in Mano Khan Chandio (about 20%) supplement their agricultural incomes with jobs with the government and in the private sector. The village has consistently received the attentions of the national and international NGOs. Furthermore, the village has a number of its former residents living outside of the village, who are a source of support and strength for the current residents.

Here again relatively higher levels of education and diversified income have not exactly translated into greater gender equity. It was reported in the focus group discussions that women are mostly confined to domestic tasks including handicrafts. Whilst the men insisted that women did not participate in any out of the home activities, the women mentioned that they were indeed in charge of taking care of the livestock. Generally the outlook of the community was conservative when it came to female mobility, like Khat Lashkar. But unlike Khat Lashkar, the higher educational levels of the males of the community did not translate into higher educational levels for the women. The female literacy rate was a dismal 11%. This is again another cautionary case of looking beyond the numbers to evaluate gender differentiated vulnerability profiles of the community.

The village of Ramlani in Tharparkar district is a moderate sized village in the middle of the desert with no access to a motorable road, electricity, or health facilities. The nearest health facility is 60 km away, and the primary school in the village is not functional because there is no teacher. The community VCI score for the village is a high 79, while the modal HH VCI score is 75. The HH VCI score ranges between 56 and 88. In this agro-pastoral village, the lives of women and children largely center around collecting water. A government installed tube well in the village yields only useless brackish water, and the nearest fresh water source for the village is about 8 km away. The women and children are largely responsible for obtaining water, which they do once a day, every day, in the winter. In the summer months, when there is a greater demand for water, they have to make up to three trips to

the water sources to obtain water. Normally donkeys are used to haul up to 65 liters of water per donkey. This translates into up to 9 hours of trekking to obtain water. There is a significant amount of seasonal male migration to irrigated areas in other parts of Sindh or to cities such as Hyderabad and Karachi. In their absence, the women reported much higher workloads, though they also enjoyed greater autonomy in decision making. Sometimes women also have to migrate with their able bodied men in search of work and water, rendering the elderly and the sick in the community particularly vulnerable.

The above case studies illustrate the stories behind the numbers of HH VCIs within agro-ecological zones. In the following section we turn to the question of vulnerability comparisons between agro-ecological zones, based upon aggregated community VCI scores.

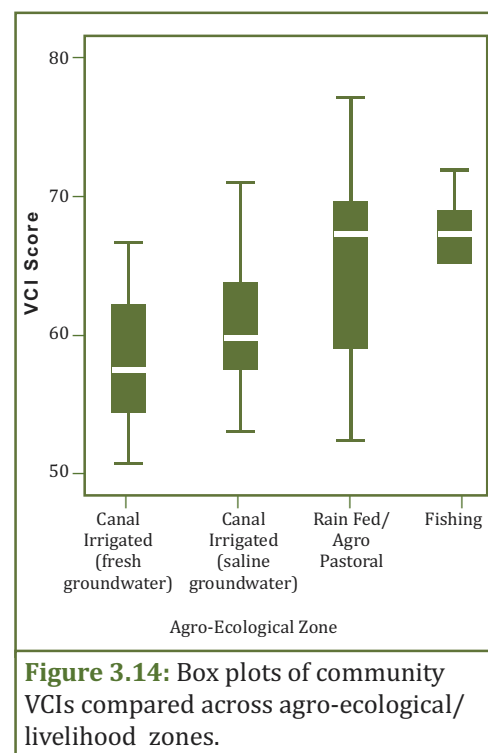
### Comparing Community VCIs across the Agro-Ecological zones/Livelihoods

The community VCI scores were aggregated and compared across agro-ecological/livelihood zones to draw some general conclusions about the state of vulnerability the higher geographical scale. Figure 3.14 illustrates the box plots for the community level VCI scores across the four agro-ecological/livelihood type categories.

According to Figure 3.14 the saline groundwater zone communities have higher mean VCI scores than the fresh groundwater zone communities. However, the difference in the means is not statistically significant.

As per Figure 3.5 and the Independent t-test performed on the data, there is a statistically significant difference in the means of the community VCI scores of the fishing and agro-pastoralist communities on the one hand and the fresh and saline groundwater based irrigated communities on the other hand. Clearly agro-pastoralist and fishing villages are significantly more vulnerable than the irrigated communities regardless of the quality of their groundwater. The fishing communities in particular, with their vulnerability scores closely grouped together, are almost all highly vulnerable.

It is somewhat surprising that there is no significant difference in vulnerability profiles between the canal irrigated villages with fresh and saline groundwater. The important insight, as may be obvious in the preceding discussion, is the significance of context and geography beyond the larger categories. While the fishing and agro-pastoralist



**Figure 3.14:** Box plots of community VCIs compared across agro-ecological/livelihood zones.



villages are more directly dependent upon natural ecosystem services, in the case of irrigated communities that dependence is moderated by the engineered irrigated landscapes that can cushion the impact of immediate changes in water availability. Furthermore, there is a greater presence of the state in the irrigated communities, mitigating their vulnerability from what it would have been otherwise. The agro-pastoralist and fishing communities seem to be at the margins of the Pakistani state's consciousness and if anything, their livelihoods are at times undermined by virtue of the state's bias towards protecting and sustaining irrigated agriculture.

## Conclusion

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The VCI results presented in this chapter present a complex picture of the diversity and complexity of the vulnerability profiles at the household and community level. In a sense the discussion in this chapter confirms what the vulnerability researchers have been espousing for the past forty years—the significance of nuance, context and attention to class and gender differentiated analysis. Specifically some of the key take home insights of this chapter are as follows:

- The VCI score is a useful tool to get indicative numbers for mapping vulnerability across space.
- Household level VCI analyses are useful to flag particularly vulnerable households within communities.
- At the higher ends of the household and community vulnerability spectrum, VCI is good at highlighting gendered differentiated vulnerability.
- At the lower ends of the vulnerability spectrum the VCI score needs to be interpreted and supplemented with more qualitative information to understand contours of gender differentiated vulnerability.
- Community vulnerability score is a good approximation for aggregated household level vulnerability at the community level. If one is constrained by time and resources, community VCIs can be a good indicator of community level vulnerability.
- Instead of the mean it is better to focus on the median or modes of household level vulnerability scores.
- Agro-pastoral and fishing villages tend to be more vulnerable than the irrigated villages.
- Income diversification, social capital and infrastructure are the key drivers of differential vulnerability at the community level.

- Income diversification and social capital are key drivers of differential vulnerability at the household level.
- Lack of female education and access to livelihoods is one of the key contributors to high levels of vulnerability.

We would like to reinforce the above main conclusions by restating that supplementing VCI scores with focus group discussions, key informant interviews and other qualitative methods is essential to understanding gender differentiated vulnerability profiles. Sometimes low vulnerability scores can hide the types of constraints to female empowerment and mobility within households and communities that can be essential for building resilience. In the chapters following this one we will be turning to linkages between the vulnerability profiles and the broader indicators of well being that are not parts of the VCI architecture. We will be exploring the qualitative data derived from FGDs and participant observations in Chapter 5 to convey the sense of the variegated reality that the VCI numbers represent.

#### **NOTES:**

1. This is a fictitious name for the real respondent, to protect her identity.
2. A mud walled structure with a thatched roof.



# 4

## Vulnerability and Development

While climate change affects both rich and poor countries, the severity of impact is intensified for the latter – specifically for those with low levels of social and economic development. Low socio-economic development means people have less awareness of climate change, less capacity to take preventive or mitigation measures, less capacity to withstand the damaging effects and to recover, and less capacity to take adaptive measures.

The VCI includes a number of development indicators (e.g. material assets) and the findings of these for communities in the four agro-ecological zones in rural Sindh are analysed in Chapter 4. However, this research study of rural Sindh also looked at a number of wider development aspects at community and household level (see below). This data provides a more detailed picture of the state of development in the study communities, setting the context for the VCI findings.

This chapter gives the main findings with regard to non-VCI aspects of development. The analysis is divided into macro-level indicators – basically at community level, including access to roads and other infrastructure for economic development, and presence of health and education facilities, and micro-level indicators – at household level, including monthly income and per capita expenditure, unemployment rate, and literacy rate.

Before detailing the survey findings, it is relevant to make a brief mention of the record of local government in Sindh. As in the rest of the country, a new local government system was established in 2001 with the aim of promoting grassroots development through local participation. In Sindh the local governments did initiate some projects yielding long-term benefits, e.g. construction of wider road networks; education and health sector issues were also prioritized.

In Tharparkar, development processes gained momentum after 2001. But the discontinuation of the local government system not only hampered community empowerment but also exacerbated development challenges at local level. The devastating floods of 2010 and 2011 made an already bleak development outlook even worse, particularly in the districts of Dadu, Thatta and Badin.

## **Macro-Development Indicators**

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### **Road Infrastructure**

The road infrastructure in all study districts was found to be in a dismal state. In particular, roads in Dadu and Badin had deteriorated after the 2010 and 2011 floods. In Thatta district, all season roads were found in 53 percent of villages, while accessibility to the remaining 47 percent is either from paved brick or unpaved pathways. In Tharparkar district, the road infrastructure has substantially improved since 2001 - earlier people travelled 48 hours to cover a distance of 100 km. Despite this, there is no motorable road to approach 53.3 percent of villages in the district. The study data confirms that there is an inverse relationship between increased accessibility and vulnerability: villages approachable by metalled road had a lower vulnerability score of 59 than those with unpaved pathways, where the VCI score was 66. This is to be expected as well, being that the existence of all season metalled road is part of the VCI score calculation.

### **Access to Economic Services**

The availability and access to economic services within a village or within close proximity (2-3 km) is directly linked with improvement in the living standards of people. The community survey was conducted in all four districts to analyze the effectiveness of economic infrastructure. Table 4 .1 presents the findings for the selected indicators of economic services in study villages. The extent of people's mobility is gauged from availability of transport or having a bus stop within the village. The survey found that transportation is largely not available within a village except in Badin district. It found that the market place is also outside the premises of villages, at an average distance of 21.4 km; the furthest distance being 100 km for village Chapar Khosa in district Tharparkar. Banking services are also not available in 75 percent of villages, as people have to travel at least 10 km to avail these.

In the rural context, the fertilizer depot and veterinary services are critical for the protection of crops and animals and thus to ensure food security. With regard to fertilizer depot, 50 percent of villages are at a

**Table 4.1:** District-wise access to economic services outside village (%)

Districts	Transport	Market	Bank	Post Office	Fertilizer Depot	Vet Services
Dadu	82.4	94.1	100.0	100.0	100.0	100.0
Badin	20.0	73.3	93.3	86.7	80.0	80.0
Tharparkar	60.0	93.3	100.0	93.3	100.0	86.7
Thatta	66.7	93.3	100.0	100.0	100.0	93.3
<b>Total</b>	<b>58.1</b>	<b>88.7</b>	<b>98.4</b>	<b>95.2</b>	<b>95.2</b>	<b>90.3</b>

distance of at least 15 km from this; people in nine villages have to cover a distance of more than 100 km to reach a fertilizer depot. Similarly, veterinary services are at a distance of at least 12 km for 50 percent of villages. The distance to veterinary services is an important number to note, being that it is generally women who are responsible for the caring of animals, and are almost certainly not going to have the type of mobility required to take their animals to veterinary services. This is particularly important because women depend upon livestock to ensure proper nutrition for their families and loss of livestock disproportionately impacts their ability to fulfil their gendered responsibilities. The analysis of economic services also shows that almost all 62 villages do not have the requisite infrastructure/services within the proximity of 2-3 km. This has immensely contributed to the higher vulnerability at the community level as well as household level, with important gendered implications.

### Education and Healthcare

The survey also looked at access to social services: education and healthcare. It found that social infrastructure either does not exist or there are quality and capacity issues. Table 4.2 highlights the inadequacy of education and health facilities for women. Girls' schools are not available in 69 percent of villages; 50 percent of girls' schools are located at a distance of 2-6 km. The emphasis on boys' education is evident from the survey: it found that 74.2 percent of villages have a boys' school, mainly at the primary level.

**Table 4.2:** District-wise availability of social services within village (%)

	Badin	Dadu	Tharparkar	Thatta	Total
Girls School	26.7	17.6	40.0	40.0	30.6
Boys School	100.0	41.2	100.0	60.0	74.2
Government Hospital	6.7	0.0	0.0	0.0	1.6
Government Dispensary	6.7	17.6	13.3	0.0	9.7

#### Box 4.1: Case of high social capital and high vulnerability

In the fishing village of Ghulam Dhablo in Thatta, which is located on an island in a creek in Keti Bundar, a family of 3 members live in extreme poverty. Bashir, his wife, and three year old daughter depend on fishing for their livelihood. Both Bashir and his wife are illiterate and count one boat and a fishing net among their assets. Their average monthly income was Rs. 10,500. They live in one room made of wood and bamboo, no sanitation, electricity, or drinking water. The closest source of drinking water is in Keti Bundar a 40 minute boat ride away from the village. With a VCI score of 71, which make Bashir's family highly vulnerable to any natural disaster, or any other crisis, Bashir believes he has a strong informal social network among his relatives, on which he can rely in times of need. Considering himself a community leader, he was able to get some assistance from NGOs in the last five years. He travels 60 km to fish and has observed the rise in sea level, the decrease in the quantity of fish in the last few years, and relies on indigenous knowledge to predict changes in weather and cyclones at sea. Living in isolation and in harsh conditions, and bearing the brunt of climate change and its affect on the rise in sea level, Bashir struggles to provide for his family.

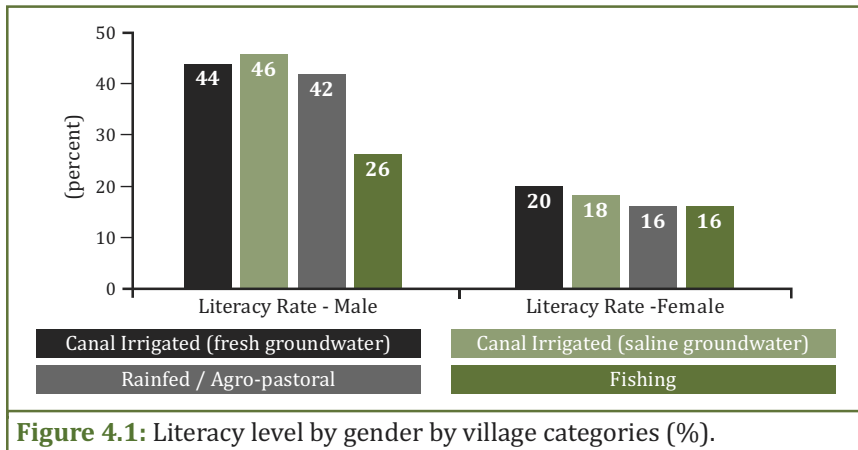
Health has seemingly never been a priority of federal and provincial governments. Government hospital, dispensary and basic health unit numbers point to significantly low health care coverage in the selected villages. The nearest MCH centre is 3 km from village Kamo Machhi, Dadu while people of village Ali Patni, Thatta have to travel the furthest distance of 100 km. Also in Thatta, village Ghulam Dhablo is the furthest - 150 km - from a government hospital, while it is located 90 km away from a government dispensary and BHU. As Box 4.1 illustrates, even with high levels of kinship ties and social networks, vulnerability is still very high in Ghulam Dhablo because of such lack of services. In district Tharparkar, the nearest BHU is at a distance of 15 km from a village, and the furthest 100 km. Lady health workers (LHWs) and trained birth attendants are not available in 69 percent and 61 percent of villages in Thatta and Tharparkar respectively.

The extent of low health coverage in all study districts indicates that vulnerability will continue to increase as communities report higher incidence of diseases due to climate variability.

### Micro-Development Indicators

#### Literacy Rate and Education Infrastructure

According to the *Economic Survey 2013-14*, the overall literacy rate in Sindh was 42 percent for 2012-13; 59 percent for males and 22 percent for females. Figure 4.1 shows the literacy rates for males and females in the study communities in all four agro-ecological zones. For males, there are marginal differences in rates for irrigated freshwater, canal and agro-pastoral communities; the rate for fishing communities is significantly lower. For females, however, the rates are low across all four zones, though again lowest for fishing as well as agro-pastoral



**Figure 4.1:** Literacy level by gender by village categories (%).

communities. The extremely low literacy rates in fishing villages can be accounted for by chronic poverty and lack of availability of functional education infrastructure. There are multiple reasons for low female literacy rates in all categories: non-availability of girls' secondary schools at village level or in nearby villages, mobility constraints for girls, and parents' views about the value of educating girls.

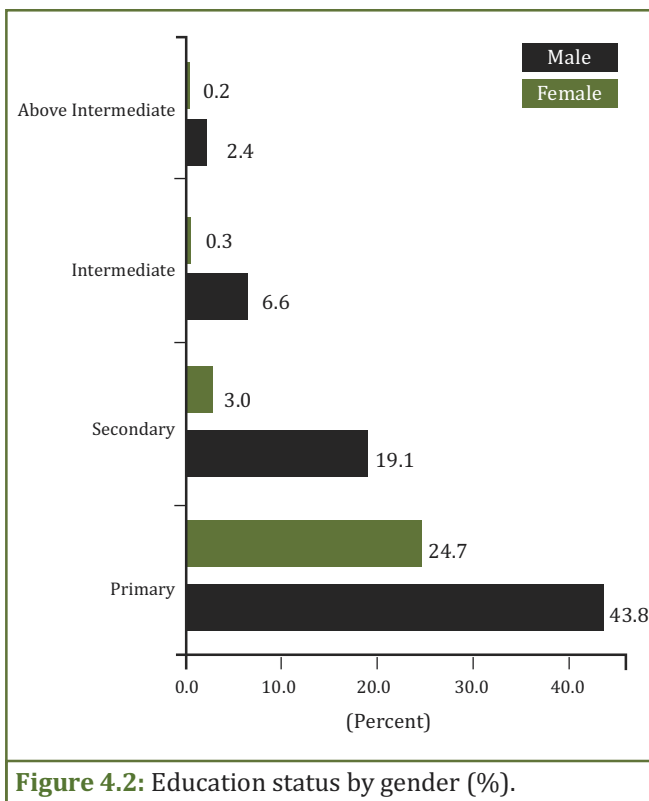
The overall literacy from the survey was 30.3 percent, with male literacy rate of 42.5 percent and female literacy rate of 17.8 percent. At village level, the highest male and female literacy rates were in village Khat Lashkar with 76.9 percent and 50.0 percent respectively. Village Ghulam Dhablo had a 100 percent male illiteracy rate, followed by village Haji Muhammad Shah with 91 percent. Similarly, 100 percent illiteracy rate for females was found in villages Ghulam Dhablo, Haji Muhammad Shah, Juber Jee and Gul Muhammad Ahmedani. The study data shows that the higher the household literacy rate the lower the vulnerability scores, i.e. index value of 60 against 66.

Figure 4.2 gives the level of educational attainment for males and females. As seen, female education drops off sharply beyond primary level, strongly indicating lack of girls' access to secondary schooling. There is an inverse relationship between VCI and education attainment: the higher the level of education the lower the VCI score, as case study in Box 4.2 illustrates. Thus, with primary and secondary level of education, the household mean VCI score was 61 compared to 49 for households above intermediate level. This is not very surprising since education contributes to the calculation of the VCI score. But it appears that education is correlated with other drivers of vulnerability because the average score differential is out of proportion with the contribution of education to the VCI score.



**Box 4.2: Lower vulnerability with a big household, through higher education and diverse incomes**

Waheed lives in Thatta, in the village of Aloo Taro, with 4 children and 8 relatives. He has a job and earns an income of Rs. 6,600 per month. His entire household consists of 13 family members, who are all literate, and among the household there are 7 earning members as well. They live on their own land, in a 4 room wood and bamboo house. They have access to drinking water from a hand pump which is a precious resource, in a water logged saline area. The VCI score of this household is 43 implying low vulnerability, and a relatively better off family. Despite being a large household Waheed appears to have a comfortable life, with a number of assets in terms of livestock such as cows, goats, donkey's and poultry. Other assets include, a harrow, an animal cart, a T.V. and a refrigerator. Although there is no electricity in the village, sanitation does exist, and mobile phones are widely used. As a member of a youth group, and the community based organisation, Waheed has access to community leadership, and has been able to get assistance from the government twice, and from NGOs five times in the last five years, indicating the importance of social networks, the presence of CBOs, and being a member of a local organisation. In these circumstances, the fact that the family has a high level of literacy, and employment, the size of the family does not seem to be a determining factor for poverty, but in fact has made the family less vulnerable.



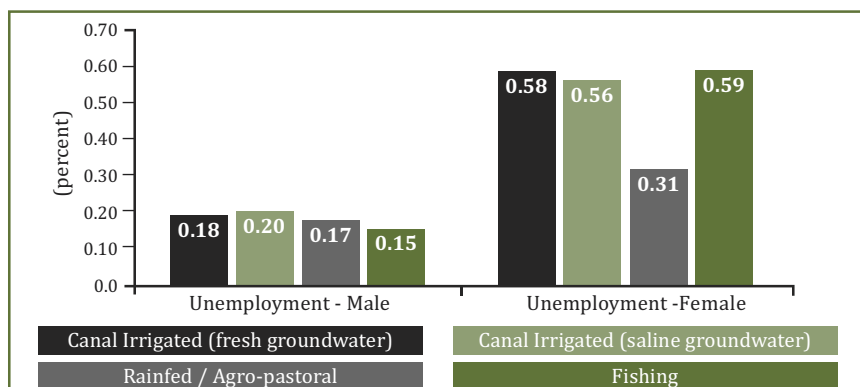
**Figure 4.2: Education status by gender (%).**

### Unemployment

Consistent with the weak economic base detailed above, and due to limited alternative sources of livelihood, the level of unemployment is high in all categories as seen in Figure 4.3. Of the four agro-ecological zones, only fishing communities have a relatively robust economic base - manifested in the lower male unemployment rate. Agriculture landholding at family level has become skewed due to distribution of land among multiple legal heirs: this makes the size of landholdings too small for productivity and profitability. Water scarcity is also a major cause of reduced farm activities leading to high unemployment rate at village level.

Figure 4.3 also highlights the bleak situation with regard to female employment. The female unemployment rate can actually be discounted due to the fact that rural women have never been considered unpaid family workers, or their home based work as employment—thereby skewing the numbers. The unemployment rate for females is lowest in the agro-pastoral category where women usually work in home based industries.

Table 4.3 disaggregates employment figures by sector - agriculture, livestock, fishing and non-agriculture - and by gender. Female



**Figure 4.3:** Unemployment rate by gender by village categories (%).

employment in irrigated fresh water villages in the agriculture sector is 31.2 percent compared with 58.3 percent in irrigated saline water communities. Over 80.0 percent of females in the saline water communities either work as unpaid family helpers or daily wage workers. Livestock activities in rural areas have substantially declined, primarily due to water scarcity and loss of natural grazing fields. In rural settings, livestock rearing was always viewed as a female responsibility, but this could not be substantiated from the field survey results. The data shows that less than 2 percent of females are engaged in livestock activities in all four categories of villages.

The percentage of female employment is higher than male employment in the non-agriculture sector across the agro-ecological zones; this is mainly due to the higher share of female engagement in home based work and daily wage work, as unskilled labour with low compensation, though that still makes for higher vulnerability for female headed households, e.g., see Box 4.3. Males earn more stable income from jobs or running businesses in all four village categories. In fishing villages, both males and females are not involved in other income generation activities because of lack of skills and training to find alternative sources of livelihood.

**Table 4.3:** Employment rates by sector and by the gender (%)

Categories	Agriculture		Livestock		Fishing		Non-Agriculture	
	Male	Female	Male	Female	Male	Female	Male	Female
Canal Irrigated (fresh groundwater)	51.0	31.2	5.3	1.8	3.4	0.0	40.3	67.1
Canal Irrigated (saline groundwater)	58.0	58.3	3.9	1.4	2.5	0.0	35.6	40.3
Rainfed/Agro-pastoral	53.1	60.9	11.9	1.9	0.2	0.0	34.9	37.2
Fishing	6.9	5.4	3.1	0.0	82.4	12.9	7.6	81.6

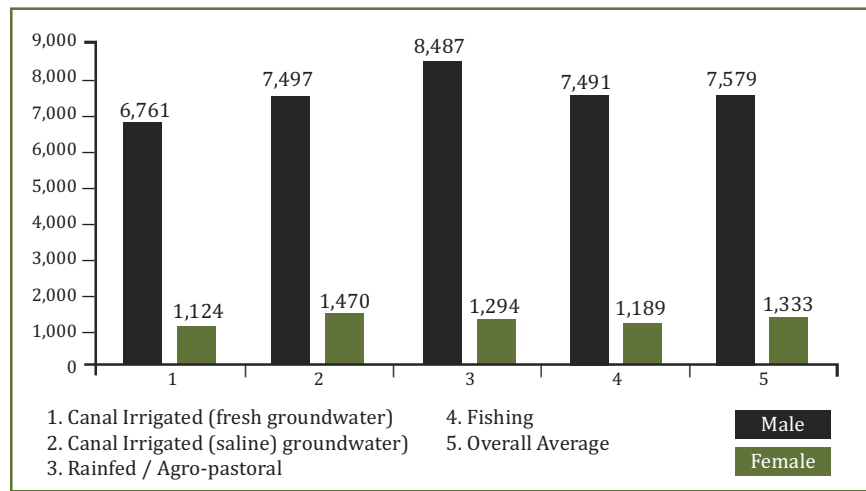
**Box 4.3: Unstable income as a source of vulnerability for a female headed household**

Female headed households are often the most vulnerable among any community, and with a VCI score of 88, a young widow 42 years old, lived with her 3 sons, daughter -in-law and grandson in the village of Jeand Zanjejo in Thatta. The entire family was illiterate. The woman sold milk to make a living, and her oldest son worked as agriculture labour. The average income per month was Rs. 4,500 of which Rs. 4,420 was spent on food, and Rs. 700 on health, clothing, social and religious occasions. The only assets were 1 buffalo and 3 charpoys, and they lived in a two room hut made of wood and bamboo, with no sanitation or electricity. In these circumstances life was hard, with a high level of vulnerability to any natural disaster.

**Income**

The analysis of monetized income or wage employment is critical for vulnerability assessment, as current and future vulnerability status is predominantly determined by whether income sources are stable or unstable. The average income per month in all four village categories for both males and females is lower than the minimum provincial average of Rs. 10,000 per month.

Figure 4.4 shows that males in agro-pastoral communities have a higher mean monthly monetized income compared with other categories. The difference stems from salary income, cultivation on contract, and daily wage farm work, that is significantly higher in agro-pastoral villages than other village categories, e.g. see Box 4.4. Due to continuous drought in district Tharparkar male family members have migrated to district Badin or other districts in search of wage farm employment or unskilled wage labour. However, the vulnerability



**Figure 4.4:** Average monthly monetized income by gender by village categories

#### Box 4.4: Education and income diversity tickets to low vulnerability in Agro-pastoralist communities

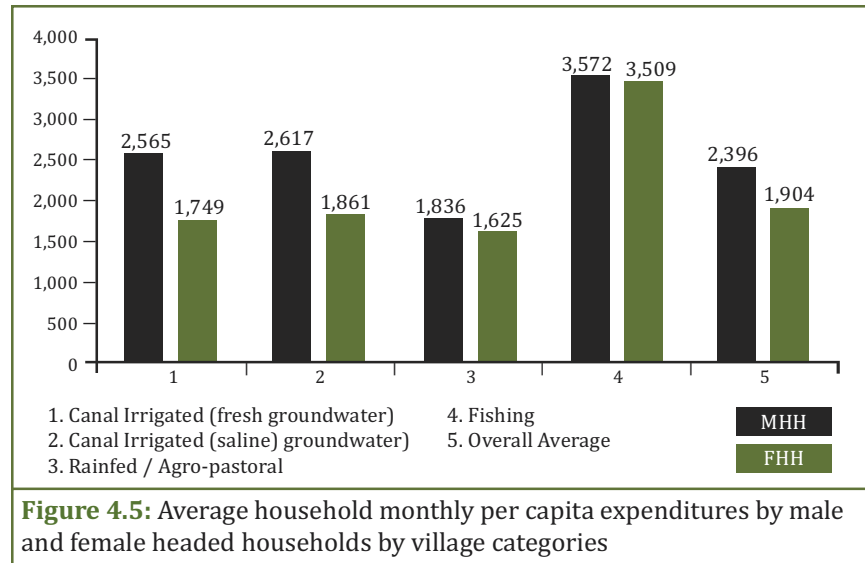
In Mondro village in Tharparkar, a household of 9 members, with a 50 year old head of household had a VCI score of 44, implying that it was relatively low on the vulnerability scale. Most of the family members were literate, apart from the woman who was the wife of the head of household. The HH and his son were both graduates, and other family members including the daughter and daughter-in-law were being educated. Being a government employee the head of the household earned Rs. 450,000 in the last year. And he had other sources of income as well such as earnings from livestock, other businesses, and crops, making the monthly income Rs. 39,541/-. The oldest son had his own land, which he was cultivating, and the second son worked as a cable operator/ manager. Given the high level of literacy and earning capacity of the male members of the family, the assets reflected the status of the family as well. A motor cycle, 2 radios, a sewing machine, some jewellery, furniture and trunks for storage were among the assets of this family. They owned their own house, had a sanitation system, solar lighting, and a mobile phone for communication. Since the family was comfortable in terms of income they were able to spend Rs. 14,370 on food per month, and other expenditure was Rs. 8,375 on health, education, clothes, transport, household items, and social expenses. The head of household was not part of any community organisation, but he had access to provincial and national leadership, which provided a sense of security and support in times of crisis. Therefore, this particular family with educated members, and stable employment, were less vulnerable to natural disasters or any crisis.

index of agro-pastoral villages is higher because of unstable income sources. The female employment rate is low among agro-pastoralists and those who are employed receive inadequate compensation for their labour because of their employment status.

#### Per Capita Expenditure

In rural household surveys, the respondents never reveal their actual income because of behavioural tendencies and anticipation of receiving cash and in-kind support. That is why income is not a good indicator of household well-being. In contrast, total or per capita household expenditure has been widely used for poverty analysis. The poverty estimates of each study district are measured to examine the correlation (if any) between vulnerability and poverty. District Tharparkar has the highest poverty estimate with 54.4 percent of households living below the poverty line, followed by district Badin with 41.9 percent, and Dadu and Thatta with poverty estimates of 40.6 percent and 37.8 percent respectively.

Figure 4.5 shows that highest per capita expenditure is in fishing villages for both male and female headed households, followed by canal irrigated saline water villages. The average VCI score of fishing villages is higher than that of irrigated fresh water villages, which implies that per capita expenditure and poverty cannot unequivocally explain vulnerability at household level. On average per capita expenditure in female headed households (FHHs) is 20.5 percent less than in MHHs. At village level, the highest number of poor households is found in village Arniaro, Tharparkar. At the other end of the spectrum, villages Haji Abdullah Ghoto and Ibrahim Shah have only 10 percent poor households.



## Conclusion

The above outline of the developmental and poverty indicators outside of vulnerability assessment exercise, paint a bleak picture of the state of development in the study districts. The discussion points to important convergences and divergences between development indicators and vulnerability were discussed in the previous chapter. We briefly summarize the key insights below:

- Access to transportation is positively associated with vulnerability.
- Access to services is positively associated with vulnerability.
- Education is associated with vulnerability but the difference in vulnerability scores between villages is disproportionate to the difference in educational attainment.
- Female unemployment is systematically under represented through conventional means of measuring unemployment, such as the questionnaire that was used to assess it.
- The quantum of income, or poverty level are not very good indicators of vulnerability. What matters more is the stability and diversity of income. This is not just because of the way VCI is structured but also true at an intuitive level, as the differences in poverty and income level between agro-pastoralists and fishing on the one hand, and canal irrigated communities indicates.

The discussion in this chapter is based upon evidence that cautions us against using poverty or income levels as surrogates for vulnerability.

The second important insight is that services—generally provided by the state, are much more influential in influencing vulnerability levels. Although the VCI structure does account for infrastructure and services, the services discussed in this chapter are not part of the VCI architecture, and yet they are highly positively correlated to the community vulnerability profiles. The finding about the significance of services is consistent with comparable research on climate vulnerability by other researchers in Pakistan (e.g., see Khan 2014). In fact, Khan’s (2014) research was conducted in two of the same districts that this project has focused on—Dadu and Tharparkar in addition to two other districts in northern Pakistan. The state clearly has a pivotal role to play in determining the vulnerability levels of the people, through its responsibility for provision of infrastructure and services to the people. There are important gendered dimensions of the lack of availability of services locally. Those implications are experienced through the culturally mediated restrictions on female mobility. This and other gendered themes are highlighted as the qualitative evidence from focus group discussions is reviewed in the proceeding chapter.



# Climate Change Perceptions and Adaptation

Information about people's actual experiences and perceptions in relation to climate change and their response to these was ascertained primarily from the focus group discussions. The key findings are detailed in this chapter. It is divided into two broad sections, the first looking at experience/perceptions of environmental hazards/climate change and the second at adaptation/coping strategies. The former includes findings about the impact of climate change and natural disasters on traditional sources of livelihood (crops, livestock, fishing), access to food and water, daily work routines, etc. The latter covers the various coping mechanisms (support from government, NGOs, taking loans, selling assets) available to affected communities as well as the ways in which they have adapted their sources of livelihood, daily routine, housing structures, etc in order to deal with the effects of climate change.

Throughout the chapter there is strong emphasis on gendered impacts of climate and concomitant societal change. Furthermore, how the adaptive capacities of men and women are inflected by developmental processes, and societal mores is also highlighted.

## **Perceptions of Climate Change/Experience of Environmental Hazards**

### **Perceptions of Climate Change**

Communities living in all four agro-ecological zones reported changes in temperature, in timing of seasons, and in timing and quantity of rainfall. Seasons were described as being more extreme, with extreme heat in summer and extreme cold in winter. Some villagers in irrigated freshwater communities said rains used to begin in June, lasting till



July and August, but now began in September. Agro-pastoral communities in Tharparkar said winter used to end in December/January but now continued until February/March. All communities highlighted the fact that rains now came 'out of season' and were at times intense leading to flooding. Despite such periodic heavy rains, overall they said rainfall was less. People also reported strengthening of winds.

*June 15 was the time when the rains would always come, now it is unpredictable. There is more heat and increase in temperature. June and July were the summer months but now there are longer periods of heat. In the past in April and May there was no heat. (MR, Mondro, Tharparkar)*

*The rains would come in June and July, but now they come in September and October. Now there is rain in some areas and not in others. In the last 10/20 years we have noticed these changes, and also because the winds are stronger this has brought the sea to become closer to us, and the clouds do not form anymore. (MR, Ali Patni, Thatta)*

Fishing, irrigated freshwater and other communities along coastal areas highlighted the growing sea intrusion. Residents of fishing villages in Thatta, for example, reported that 50-60 years ago the sea was 200-250 km away but now was close to the village; indeed, living in creeks, they said the water was almost at their doorsteps. Villagers in Ali Patni (Thatta) accounted for the increased heat as being due to the closer proximity of the sea (from almost 100 km away 20 years ago to now just 40 km away).

In addition, villagers in all communities noted changes in water quality from sweet to bitter, though some reported the opposite change from bitter to sweet.

*First we used river water now we use water from hand pumps, and in the past there were wells of 30-40 ft and we got sweet water. Now, because of the flooding of the river, the wells have been damaged, and even at depths of 60-70 ft we get bitter water. (MR, Aaloo Taro, Thatta)*

*In the past we had sweet water at the depth of 20 to 30 ft. Now at 15-20 ft it is bitter. Now we use hand pumps....and even up to 1,000 to 1,500 ft the water is bitter. (MR, Hashim Soomro, Badin)*

The changes in seasons, temperature, rainfall and so on described above have led to resultant changes in the local flora and fauna. People in irrigated freshwater communities noted the loss/reduction of many species of trees and plants, e.g. *babbar* (*Acacia nilotica*), mango, *jar* (*Salvadora persica*), olive trees and some species of grass; however, there was widespread reporting of increase in *devi* trees (mesquite: *Prosopis galindulosa*). Among fauna, animals such as rabbits, wolves and deer have disappeared both due to changes in climate and increased population pressures (e.g. leading to clearing of land for agriculture). Those in irrigated saline communities noted the disappearance of tali (Indian rosewood: *Dalbergia sissoo*), *babbar* and *kundi* trees (*Prosopis cineraria*) and of wild animals/birds including rabbit, jackal, partridge and peacock, and reduction in numbers of horses and camels. Agro-pastoral communities in Tharparkar noted the disappearance of peacocks, quails and even vultures (*and so the natural way of keeping the place clean has also come to an end*) and of numerous animals:

*We had horses, which roamed here, but due to the lack of grass/fodder they have vanished. Fifty years ago we had deer, wolf, rabbit but now there is no fodder or trees so these have all vanished.* (MR, Besarno, Tharparkar)

Fishing communities reported that many species of fish have decreased in numbers or even disappeared [e.g. *lohar* (fossil cat: *Heteropneustes fossilis*), *kanga* (needle fish: *Xenentodon cancila*), *palla* (hilsa shad: *Tenulosa ilisha*) and *paplet* (pomfret: *Brama brama*)]. People living on the banks of Manchar Lake (Dadu) reported a major change in the quality of water in the Lake and its ecosystem (Figure 5.1). From being clean and sweet, the water has become unfit for human consumption. Manchar Lake was once a unique ecosystem, the habitat of many species of flora and fauna, aquatic plants, reptiles, migratory birds and so on, providing abundant fish; the fertile land supported agriculture and livestock.<sup>1</sup> However, its decline stems from pollution rather than climate change: effluents from the Right Bank Outfall Drain (RBOD) have led to loss of vegetation and reduction in fish numbers, in turn leading to reduced income for fishermen, as noted in Chapter 3.



**Figure 5.1:** Fishing community living on the bank of Manchar Lake.

As well as the natural flora, crop production across the study communities has also been affected by climate change, in particular by untimely rains and extreme winters:

*Untimely rains/floods damage our crops, for example if cotton is ready for picking getting rain at that time is quite a bad situation for all of us. (FR, Haroon Samejo, Badin)*

*We prepare for the harvest assuming the rain will come in June/July but when it is delayed and comes in September then all our preparations go to waste. If it rains too much, then the grass is destroyed and the livestock dies. (MR, Besamio, Tharparkar)*

*We cultivated tomatoes but a few days before picking of the crop in winter, the temperature was extremely low so all the crop was damaged. (FR, Jam Babbar, Dadu)*

The changes in climate/temperature have made life more difficult for ordinary people, especially women. Women reported struggling to carry out all their duties in the increased heat; some said that, unlike in the past, it was hard to work without electricity. Similarly, wood/fuel for heating has become a necessity in winter.

*Ten years ago it was cooler and we could live without electricity, but now it is very hot. (FR, Ali Bux Tewana, Dadu)*

*Summer is difficult for us, especially when we labour on grinding, cooking and doing other daily chores. You people are lucky: you have water and good climate compared to us – we have no such facilities. And we face acute shortage of water. (FR, Malook Mahar, Tharparkar)*

### **Experience of Natural Disasters**

Alongside changes in the climate, people reported an increase in the frequency and intensity of natural disasters, in particular cyclones and flooding. These in turn cause extensive damage to houses, to crops, and livestock.

*I don't know changes in climate but it was peaceful and simple life, not hectic life like this. There were no disasters, which are so frequent now. (an old woman, Jam Babbar, Dadu)*

*In high rains and flood... we lost everything: houses, livestock, bedding, all other general stuff of the house. Fodder and agriculture was damaged, and crop (production) was stopped as the land changed..... Five people died, one in the flood, the others were sick and due to non-availability of quick treatment died in the camps. (FR, Rajo Dero, Dadu)*

*The flood five years back was very dangerous: it made life very miserable as our houses were completely damaged and livestock, chickens, crops and trees were all finished....Then we moved to Thar where further livestock died; then we came back to our village where we then faced a drought-like situation.*  
(FR, Gul Muhammed Ahmedani, Badin)

Natural disasters often force people to flee their homes and migrate to safer areas. Some irrigated freshwater community members said they were forced to leave their homes and seek shelter in larger buildings, in camps or with relatives elsewhere: *In the last flood three years ago, all the houses fell down so we had to migrate* (FR, Aaloo Taro, Thatta). Others said they were unwilling to leave the area ‘where their forefathers lived for centuries’ and thus would put up with extreme situations. People were also fearful of losing their land:

*We are not migrating; despite living in poverty, we will never leave our roots as no one will give us an alternative place and we don't want to be dislocated.* (FR, Fateh Muhammed Mashaiq, Badin)

Sometimes this insistence upon bearing the extremes instead of taking the step of migrating was inflected by issues of identity politics and class:

*If there is no rain then there is drought, livestock die, we starve, but we do not go to Sindh because we are Rajputs. Some from Meghwar (Hindus) go, but only the men for manual labour because they are illiterate.* (FR, Dondio Meghwar, Tharparkar)

At times there were contradictory results with respect to overall vulnerability profiles of the communities as mentioned in Chapter 3.



**Figure 5.2:** Women and girls bear the difficulties and suffering

(SPDC Archive photo).

But the issues of limited gendered mobility and domination have to be reiterated here as very material to the physical well-being of women in the face of environmental disasters, e.g.:

*If we face anything like a disaster it could be a difficult situation for women to shift to another place as being part of rigid and customary tribe we will not be allowed to shift to camps since we are not allowed to face any alien or outsider. (FR, Juber Jee, Dadu)*

Juber Jee has a VCI score of 57, relatively low, yet as the above quote illustrates, women are highly vulnerable in the event of natural disasters because of the highly patriarchal nature of society and the restrictions imposed on their movement. It should also be noted that people's fears about losing their land/assets in the event of migration are sometimes justified. Irrigated communities in Dadu complained that, when they returned to the homes they had fled from, they found these had been looted:

*In emergency time we have just taken our children with us, and left all our livestock and other important household items in the village. However, it was not flooded. But people had taken the items, all the houses were burgled. This was an additional shock for us, as we are already poor and it took us years to collect those items. (FR, Haji Panah Gaincho, Dadu)*

For many communities the damage caused by flooding, cyclones, etc. represents an irreparable loss: lacking the resources to recover, they end up being driven deeper into poverty and even indebtedness. Among those whose homes were destroyed, some were able to rebuild but others were still in temporary accommodation.

*Before floods we were rich and had good quantity of livestock, now people possess fewer livestock. They have few sheep, goats and cows: total 100 goats along with 30 cows in whole village (FR, Gul Muhammed Ahmedani, Badin)*

*One lady said I had more than 35 goats and a couple of cows, but all those drowned in the recent floods. Now it is impossible for me to even buy one goat. (FR, Haji Abdullah Halepoto, Badin)*

*Recently when our rice and wheat fields were damaged and we had no alternate source (of income) .... There was no fodder for the livestock as all the land is affected by the floods. So this situation takes us to dangerous poverty level when we are hand to mouth. (FR, Kamo Machhi, Dadu)*

## Impact on Nutrition and Health

Ensuring adequate nutrition was described as difficult by many communities even in 'normal' circumstances, as income from agriculture and livestock has fallen, as the natural flora and fauna have been depleted, and as food inflation has increased. While the drop in food quality and quantity affects whole families, it is women who appear to bear the heaviest load, and are most vocal about this concern:

*The food we eat has changed; we had vegetables, now we eat red chillies and roti (bread). Because of the drought we cannot grow food. (MR, Amji Jo Goth, Tharparkar)*

*In the old days we had vegetables, milk, curd and butter; now we have nothing like that. (FR, Besarno, Tharparkar)*

*In the past we had one goat so we were able to get some milk, now we drink black tea as we have no more goats due to drought and other disasters. (FR, Sarh Bano, Tharparkar)*

*In the past there was less heat and we spent less. Now things are very expensive. We only eat vegetables. We cannot afford meat or eggs, it is too expensive, but sometimes the men eat eggs. (FR, Dondio Meghawar, Tharparkar)*

*In the past we used to eat fish. Now even those, due to the changes in weather, have vanished. Now we only get daal (pulses) and potatoes from the town to eat. (FR, Hashim Mandrio, Thatta)*

*It is very tough to meet needs on a daily basis, with the limited amount for food... especially in this time of high inflation like a kg of flour costs Rs. 40-45. Due to shortage of food, first we serve to children and males; few times we females have to survive without meals. (FR, Jam Babbar, Tharparkar)*

As the above quotes illustrate the brunt of the nutritional shortage is borne by the women in the first instance. Because of entrenched patriarchy women are the last ones to have their nutritional needs met, particularly in times of dire scarcity. Natural disasters (and migration) exacerbate these basic nutritional challenges; again, women face particular difficulties in accessing food, fuel wood, etc. and thus in meeting the nutritional needs of their families:

*In disaster time there were not sources of income so it was difficult to buy food items. So sometimes we are starving along with our children, it is really hard time for the whole family. (FR, Haroon Samejo, Badin)*



*We are stuck in the houses when rain starts and we were not able to find fuel wood so it is real hard time for family and especially for children, who suffer in starvation (FR, Gul Muhammed Ahmedani, Badin)*

The health situation of the study communities paralleled that for nutrition: they appeared to be suffering already from serious health issues which were then made worse in times of natural disaster, with again women being particularly negatively affected. Common ailments listed by respondents include fever, malaria, malnutrition, diarrhoea, skin rashes, jaundice, liver problems, kidney stones and gynaecological issues. Many people reported an increase in illness, including hepatitis B and C, as a result of climate change and natural disasters. Irrigated saline communities highlighted the damaging effects on people's health of drinking contaminated water in the wake of floods/disasters; some reported a rise in polio and cancer.

*Due to the bad water the skin rashes have increased (MR, Ali Patni, Thatta)*

*After a natural disaster, there is an increase in fever, polio, cholera, stomach problems, vertigo, and so on. There is no electricity. (FR, Hashim Mandrio, Thatta)*



**Figure 5.3:** Communities in rural Sindh have limited access to health care. (SPDC Archive photo)

On the one hand, communities in the study area have serious health problems; on the other, they have extremely limited access to health care. Few communities reported having a local health facility or staff. A reduction in the number of dais (traditional birth attendant) and in availing services of *hakeems* (traditional health providers) has removed that traditional form of health care – and made healthcare more expensive. Access to distant health facilities is constrained by cost considerations and, particularly

for women, mobility constraints either because of strict purdah enforcement or because of migration of male family members.

*In the past the people would use herbal/traditional medicine but now they are only going to the doctor. In the past when we got sick we used camels and horses to go to the hakeem, but now we use pick-ups (an automobile). (MR, Aaloo Taro, Thatta)*

*In the past there were a few dais in the village, but now we have to go to the towns. The number of normal childbirths is less and (C-section) operations are more. (MR, Haji Abdullah Ghoto, Thatta)*

*For maternity problems there is no Lady Health Worker or trained dai available, so in any emergency we rush to Piyaro Khan Town where we get female doctor; it is 10 km away and in general we get treatment which costs around Rs. 1,000, but in delivery cases and other maternity cases they charged Rs. 5,000 to Rs. 7,000 which is not affordable by any poor person. (FR, Juber Jee, Dadu)*

*Some women get gynaecological problems, which are chronic as they could not afford to go to hospital frequently. (FR, Gul Muhammed Ahmedani, Badin)*

*We cannot move without permission of our males; in emergencies too we have to take a male otherwise we are not allowed to take them (sick women) for health emergency. (FR, Khat Lashker, Dadu)*

As the above quotes illustrate, one of the more insidious consequences of male migration, in addition to the increase in women's work load, is not being able to access health care. For example, to approach anybody beyond a husband for transport to the health facilities for gynaecological problems would be unthinkable, meaning the women just suffer in silence. Tribal conflicts imposed further constraints on women's access to services in some communities:

*Due to tribal clashes, women never go to other areas of those (rival) tribes: they say those are no go areas. So women are not able to get water, attend school or visit health centres in those areas. (FR, Juber Jee, Dadu)*



## Warning Systems and Interpretations of Climate Change

When asked about warning systems for natural disasters, people described the traditional system that had been dependent on predictions by elders or on interpretation of natural changes around them.

*If the kundi tree becomes green then it means there will be less rainfall, and drought will increase. And if the kundi tree leaves are burnt, or if the tree looks as if it is drying then it means the rains are nearby. (FR, Mondro, Tharparkar)*

*There will be drought if the kong bird (crow) makes noises; if the cuckoo sings this means there is rain and when a frog sounds this is indication of flooding. (FR, Muhammed Yameen Jat, Badin)*

Some villagers said they now had no warning system at all, while others reported reliance on TV and radio or announcements through mosques. There was a marked gendered differentiation of access to such modern warning systems, however, with women having less/no access.

*We (women) never get any prior information (e.g. about cyclones) from any source. Now males are alert and they are getting news from the radio. (FR, Gul Muhammed Ahmedani, Badin)*

*Generally we get information from males as they get information from main towns. (FR, Ali Khan Jamali, Badin)*

Some people reported changing from traditional to modern warning systems but said they lacked faith in the latter. Local interpretations or understanding of climate change focused particularly on wind direction and rainfall patterns:

*In the past the wind would blow from all four sides, but now for some reason the wind only blows from one side. The rains we get are now from the sea. And rain from the sea is called samondri barash (rain from the sea). This contains salt and affects the soil so nothing can grow on it, and the land becomes waterlogged. When there is a lot of samondri barash then the water becomes bitter and the land loses its strength and less crops grow...Now there are more cyclones and waterlogging and salinity, and it has destroyed the soil. (MR, Dondio Meghwar, Tharparkar)*

Climate change and natural disasters were attributed by some to the misdeeds of people, i.e. punishment from God: *disasters always come when people are away from God and get involved in misdeeds.* Whilst on

the one hand such moralizing about climate change could be dismissed as misplaced piety or superstition, on the other hand it could also be interpreted a la Wescoat (1991) or Hulme (2009) as expression of deep angst about the eviscerating social and environmental transitions that the study communities are experiencing. This is a recurring theme through the focus group discussions, particularly in the agro-pastoralist villages:

*We committed sins, that's why we are getting all these disasters: people were good in the past, so they were blessed.*

*We normally pray and go to the 'pirs' and 'murshids' (spiritual leaders) to beg peace and blessings upon us. As we know they give those things, so when we beg from them they give mercy and save us from all disasters. (FRs, Nebaro Yusuf, Tharparkar)*

*One old lady said, 'Maybe we are not good Muslims and not good human beings, and so are facing these mega disasters, as I don't remember facing any such disaster (when I was young). (FR, Umeed Ali Babbar, Dadu)*

### **Impact on Livelihoods**

Traditional sources of livelihood among the study communities have been significantly affected by climate change and natural disasters. Farmers in irrigated freshwater, irrigated saline and agro-pastoral communities reported a significant reduction in agricultural productivity, to the extent that they have had to give up growing certain crops/vegetables: in Hashim Mandrio (Thatta), for example, local farmers said they no longer grow chillies because of water shortages.

*In the past if rice was 60 to 70 mds<sup>2</sup> per acre, now it only gives 40 to 50 mds per acre. (MR, Gul Muhammed Ahmedani, Dadu)*

*We grew bajra (pearl millet) and because of the drought we have no more bajra crops. Now we are just getting 4 mds per acre, in the old days we had 40 mds and we were able to save it in our gundis (a storage vessel) for several months. (FR, Besarno, Tharparakar)*

*We had two crops in the past but now we get only one and it is also not good in terms of quantity and quality, and we get half the quantity which we got in the past. (FR, Mondro, Tharparkar)*

*In the past there was 1,000 to 1,500 mds sugar cane per acre, but now it is only 500 mds per acre. Cotton has decreased from 40-50 mds/acre to 20-25 mds/acre; rice from 50-60 mds/acre to 30 mds/acre. (MR, Fateh Muhammed Mashaiq, Badin)*



**Figure 5.4:** A woman managing livestock in a village of Dadu.

Similarly, agro-pastoral communities have seen livestock production suffer as a result of climate change and lack of fodder/water for them, as well as lack of veterinary services. People, particularly women, reported having decreased numbers of livestock and noted the increased sickness among livestock.

*Livestock mortality has increased; people have to buy fodder for animals in the summer and cannot afford it. High inflation has reduced purchasing power. And in the drought season people sell their livestock for survival. There is lack of drinking water in the village, so we have to go more than one kilometre to fetch water. The bitter quality of water causes diseases in livestock. (FR, Panpario, Tharparkar)*

*We had cows, buffaloes, goats, sheep, horses, donkeys and camels. Now we have a few goats and donkeys, which we use to fetch water. Twenty years ago we had 400 goat and 20 sheep. Now livestock is very sick. (FR, Mondro, Tharparkar)*

*The health of livestock is not good: when we cannot afford to give them good food and water, then the price of the animal declines in the market. A goat that sells for Rs. 5,000 normally sells for Rs.2,000 in times of drought. (FR, Arniaro, Tharparkar)*

Almost all of the above quotes are from female respondents because in almost all rural and agro-pastoralist communities in the study area, livestock management is the responsibility of the women and children. Livestock is also an important source of nutrition for the poor families and therefore its upkeep and health is of particular interest to the women.

Fishing communities have been particularly badly hit by the decline in fish numbers – due to climate change as well as the impact of international trawling and use of larger nets – and for many fishing is no longer a viable source of income:

*Our forefathers were fishermen, and they went for about 100 to 200 km away to fish, but now they have to go almost 500 km close to the India border to find fish, because the fish has become less close to the shore. In the past there were more fish now there are much less. The fish were called hero (red snapper: *Lutjanus campechanus*), paplet, sano (a type of tropical fish) were caught. Now we do not get sano fish....The fish were also heavier in the past, but now they are light and less in quantity. (MR, Hashim Mandrio, Thatta)*

*Five years ago we caught 10 kg of fish in one hour, now we cannot even get 10 kg in one day. (MR, Haji Ismail Jat, Thatta)*

*This (Gajj) is a dangerous net, and the small fish are also caught, and so the fish species is becoming less. Now the fish catch is almost 70% less, than before. Now only 30 % remains. In the past the fish such as soho and khago (Rita rita), were in existence, now these have decreased in quantity. In the past whenever we caught fish the catch was at least 4-5 kg, now we only get 1-2 kg. We used to catch crabs, and paplet, now these are also less. (MR, Ali Patni, Thatta)*

### **‘A Woman’s Work is Never Done’**

Female participation in outside work (external to the home) varied by agro-ecological zone and from one community to the next. Among irrigated freshwater and irrigated saline communities, in some women did help out with agricultural work, but in others enforcement of strict purdah meant women could not work in fields:

*We are doing labour in fields of rice, cotton and sugarcane (belonging to landlords). Women plough seeds and carry out cotton-picking jobs for which we get Rs. 200 per day. (FR, Ali Khan Jamali, Badin)*

*Women are just bound with household activities....Previously all were involved in agriculture, livestock and water fetching but with the passage of time, and rise in education, now it is mostly only elderly women who go out to work. (FR, Umeed Ali Babbar, Dadu)*

*Women are not allowed to work outside the house. So no women are involved in agricultural activity. They are never involved at any level as their purdah is strictly observed and men will never allow them to be in the fields. (FR, Juber Jee, Dadu)*



**Figure 5.5:** Necessity and survival: young girls seen fetching water.

For women in irrigated freshwater communities who do carry out agricultural work, a typical day entails waking up, making breakfast and cleaning the house, caring for livestock, then collecting grass and working in the fields. These women return home to make lunch and after serving it return to the fields, coming home again in the early evening. Women confined for reasons of purdah to their homes do not work in the fields but carry out all other tasks in the same way. Female duties typically include collecting water (Figure 5.5), collecting firewood, caring for children, washing clothes, milking and making butter/ghee. All household and childcare duties are the responsibility of women, though in some communities males do provide help, e.g. in Sultan Bhatti (Badin) men collect fodder while women care for livestock. The workload of women in fishing, agro-pastoral and irrigated saline communities is similarly heavy:

*Pattern of activities is we wake up at 5.00 am, start day with prayer and then cooking, washing, skilled work (knitting fish net, saggi work, qureshia work, tailoring). We have some livestock so collect fuel wood, carry out collection and drying of cow dung. After dinner then bedding and if ....electricity allows us so we also chat and do some skilled work late at night. (FR, Manchar Lake, Dadu)*

*Our daily routine is we make tea then clean the home, wash pots and clothes, go to fetch water and collect fuel wood, then cook the meal and go to agriculture fields at 8.00 am, then come back and cook food and then sleep. We take two trips to collect water from the well which is 1 km away. When there is no agriculture activity, then we repair houses and clean last year's bajra. (FR, Mondro, Tharparkar)*





**Figure 5.6:** The water source being shared with animals in Tharparkar.

*Women are working on plastering their houses, taking care of livestock, child care, washing clothes and pots, cooking and bedding, and so on..... We get maximum five to six hours of sleep.*  
(FR, Umeed Ali Babbar, Dadu)

In some communities, women claimed that their workload had been reduced as a result of modernization, e.g. they used to have to grind rice and spices for cooking, but could now buy these from the market. While some said installation of hand pumps in houses/village centres had made water collection easier, many more across all four agro-ecological zones still described this as a major chore (Figure 5.6):

*We fetch water from the well. We go twice to fetch water for household chores, in the morning and evening, and each time it takes 2-2 ½ hours. If anyone has livestock they have to go more often.* (FR, Besarno, Tharparkar)

*We get water mainly from the nearby tap and water course. It takes half an hour for one round and we go 10-15 rounds because we also get water for livestock and other household chores along with drinking water.* (FR, Gul Muhammed Ahmedani, Badin)

*Now we have water facility, about 20-30 years ago we fetched water from 2 km away to our village. It is blessing for us, as it saves half a day of our time, and we spend that time on some other productive activities.* (FR, Kamo Macchi, Dadu)

*In this area there is only one hand pump in another village, but if anyone takes water from that, the people of that household have to pay Rs.500 per month for the water. Since we cannot*

*afford Rs. 500 we have to walk for two hours to get water. (FR, Ibrahim Bhatti, Thatta)*

*We lost our hair because of carrying water pots on the head. (FR, Muhammed Saleh Lanjo, Tharparkar)*

Women in fishing communities have been badly hit by the decline in fishing, which was a source of income as well as food for them. Women used to participate in fishing activities alongside male family members but their role has changed and – lacking alternative sources of livelihood – they are increasingly confined to duties within the house:

*Whereas in the past women were involved in fishing and net weaving and fish related activities, now their roles are confined to domestic tasks. And although they make handicrafts for their personal use, they do not have access to markets or the skills required to meet the quality of the demands of the handicraft market. Hence, there is no opportunity for the empowerment of the women in this fishing community. (FR, Manchar Lake, Dadu)*

Women in all agro-ecological zones engage in some form of traditional skilled work. Those in irrigated freshwater communities reported carrying out handicraft production (embroidered pillow covers, bedding and clothes, *rilli*<sup>3</sup> work/patch work quilts), some for commercial gain but others simply for their own use (e.g. in daughter's dowry). Women in Kamo Machi (Dadu), for example, said they would feel awkward selling their handicrafts: they also said they never sold the milk from the livestock but used it for their families and gave any excess away to needy neighbours – an example of the 'moral economy'



**Figure 5.7:** Women making local handicraft in a village of Badin.

being practised by women. [This was also cited by agro-pastoral communities in Tharparkar, where women said they: *even give food to poor people of the village.*] For those that do sell their handicrafts, a young woman could make an average of two *rillies* per month selling for Rs. 300-500 each. Mixed replies were given with regard to control of such income: some women said they could decide on its spending (on themselves or to meet household needs), while others said male family members did so.

Similarly, in fishing communities, women reported making fishing nets while those in irrigated saline communities prepared handicrafts and carried out ‘*pesh roping*’ (used in making beds – Figure 5.8) and women in agro-pastoral communities said they made carpets. Again, control of income generated through women’s labour varied:

*We normally make carpets. One carpet takes 15 days and we get Rs. 1,000 to Rs. 15,000. We make these collectively so share the amount equally amongst all. We get Rs. 1,000 to make one gajj (embroidered neck piece); it takes a month or more than a month to make this. (FR, Malook Mahar, Tharparkar)*

*The women embroider for themselves, and if they sell some stuff then they have the right to keep the money. (MR, Fateh Muhammed Mashaiq, Badin)*

In times of hardship, many women reported responding by increasing handicraft production for sale or finding other sources to generate income. However, in general, work opportunities for women were



**Figure 5.8:** A woman making rope with pesh in a village of Dadu.





**Figure 5.9:** Women plastering mud walls.

limited by a number of factors: living in rural areas, mobility constraints due to culture/religion (whereby women cannot leave their homes), lack of spending power in villages (to buy handicrafts) and lack of access to more lucrative city markets. In the wake of natural disasters, women's workload increased in other ways as well: women have to take water out of flooded houses; they work alongside men in reconstruction of homes typically, men put up wooden pillars and thatch roofs while women build and plaster mud walls (Figure 5.9). In agricultural communities, they help prepare land for replanting.

*In time of need we (males and females) collect grass and fuel wood and sell it for Rs. 30-40. Some women have skills and they make rilli's and sell it. (FR, Fateh Muhammed Mashaiq, Badin)*

*After floods women also work hard with males on lands to make them level and restore it to the previous condition, ready for cultivation. (FR, Umeed Ali Babbar, Dadu)*

### **Gender Empowerment**

Women's say in decision-making on wider issues ranged from non-existent (all decisions made by men) to partial (jointly with men): there were no significant issues on which women had sole decision-making power. Where they did have a say in decisions, these were mostly related to family matters; however, even decisions about contraception could be made by men:

*Women do sewing, handicrafts and can spend it (money earned from this) on household items. Sometimes the men take money from the women. In family matters, both men and women can make decisions, and these have the same balance, and they make decisions together. (MR, Haroon Samejo, Badin)*

*Males make all decisions, but females' suggestions are taken only in domestic activities. (FR, Khat Lashker, Dadu)*

*Budget is definitely men's matter and they (men) never give cash in hand to women; according to them, when they meet every requirement, then why give cash to her? (FR, Gul Muhammed Ahmedani, Badin)*

*Decision-making is not women's business; these all issues are men's business, they are powerful agents of society, they are making all decisions. (FR, Haji Panah Gaincho, Dadu)*

*Men decide for number of children and family planning matters. (FR, Fateh Muhammed Mashaiq, Badin)*

Perceptions of women's decision-making power could differ between males and females. In Ali Patni (Thatta), for example, men said women were only asked for their opinion on marriage issues, and did not have the right to make decisions, while women claimed: *The decision regarding marriage is one jointly by the men and the women.* Other communities reported an increase in women's decision-making power when males have to migrate for work: *When they are away we make some decisions* (FR, Gul Muhammed Ahmedani, Badin).

Overall, then, women's empowerment is weak, but in some communities they are especially suppressed, even subjected to regular physical violence. It is noteworthy that such actions are endorsed by women themselves:

*Domestic violence in this tribe is common and women take it as their life routine and they have no objection to it. It is man's honour and it is his right to beat women since women are not very intelligent so they make mistakes and men always correct it, so sometimes they beat them. (FR, Juber Jee<sup>4</sup>, Dadu)*

Access to education was limited across all four agro-ecological zones, and even more so for girls. People cited cases of ghost schools/teachers drawing salaries but not working: *Teacher is not coming but he is regular in drawing salary; they all are supported by local influential* (FR, Kamo Machhi, Dadu). Girls were also hampered by gender constraints: *Our males are never for girls' education* (FR, Juber Jee, Dadu). There were a handful of communities where education was stressed, including for girls, notably Khat Lashker. However, the common theory that education leads to greater female empowerment did not necessarily hold true in this study community as discussed in Chapter 3.

## Adaptation/Coping Strategies

### Support from Government and NGOs

Government and NGOs are potential sources of relief and support for communities facing hardship/struck by natural disasters. Unfortunately, the role of government in assisting people in the study area was consistently poor: some communities reported being evacuated to government camps or given relief goods (Figure 5.10) and, among irrigated saline communities in particular, there was a relatively higher prevalence of Benazir Income Support Programme (BISP) and Watan Card<sup>5</sup> beneficiaries. But overall, government support was described as minimal. Several people voiced the opinion that government aid had not reached them due to corruption.

*Government helped us in time of emergencies: they gave us clothes, grocery/rations, and other general items through planes as there was water around the villages so tracks were damaged and transport (vehicles) could not access the village. We also get emergency stipend from Benazir Income Support Programme. (FR, Hashim Soomro, Badin)*

*Political leaders are not helping us in time of emergency. They visit our village at election times only. (FR, Fateh Muhammed Mashaiq, Badin)*

*In difficult times we help each other and support each other. (MR, Jamal Din Chandio, Badin)*

*People get donations in our name and build their bungalows in Hyderabad and Karachi. We always cried to the authorities to give donations directly but they always give through government and other leaders so it never reaches the needy villagers. (FR, Gujar Kot, Badin)*



**Figure 5.10:** A flood affected family living in a tent (SPDC's archive photo).

Several villages in all four agro-ecological zones described assistance provided by NGOs, e.g. tents, rations, hand pumps, toilets, for housing reconstruction. There were also examples of NGOs raising community awareness about disasters and how to mitigate their effects/respond to these, and guiding them to access government social protection schemes. However, the overall picture which emerges, is that NGOs provide at best temporary assistance – not sustained support. Several respondents also expressed cynicism about NGOs, claiming that they visit needy communities to gather information but then do nothing.

*We have not found any NGO who will help us. Just get 2 kg flour and 1 kg sugar and then we were waiting for another round of the rations. (FR, Muhammed Yameen Jat, Badin)*

*Some NGOs like IRC and Thardeep helped us but they just gave some food relief for a short while. Some have resolved electricity problems and fixed damaged transformers. Some CBOs were very active as they were like a bridge between NGOs and villages, as they collected all data and distributed to all NGOs, government, etc. so they could give us relief. (FR, Umeed Ali Babbar, Dadu)*

*The NRSP has enabled us to save our own money, and also trained us in disaster management, and taught us to build our houses on high ground, and to reinforce our houses. In the 2011 flood, due to migration, the HANDS NGO, also helped us, and govt. gave us Watan cards. The NRSP also gives us health education. (MR, Gul Muhammed Ahmedani, Badin)*

*No NGO has ever come to our village as they always say that katcha area is tough area; due to conflicts they are afraid to come here. (FR, Juber Jee, Dadu)*

### **Community-Based Coping Strategies**

One 'coping' strategy in times of hardship reported by numerous communities is taking loans, in some cases from local employers (e.g. carpet industry owners) to be paid back in labour, and in others from NGOs (e.g. TRDP). Another is selling assets, e.g. livestock, fishing boats. While such measures can provide short-term relief, in the long-term they can trap families in a vicious cycle of increasing indebtedness:

*We only fish so when a natural disaster occurs then we become unemployed and have no income. So we have taken loans from the boat owners and we are in debt. Till we return our loans we cannot go anywhere. (FR, Ghulam Dhablo, Thatta)*

*Few women were pregnant and community hired some boats for reaching the DHQ in case of emergency delivery cases. They sold their cattle for bearing expenses in case of health emergency. (MR, Haji Faiz Muhammed Leghari, Dadu)*

*We get loans when we cannot meet our expenditure. One family has more than one lac [hundred thousand] loan. We take loans from Thardeep. Six women from the Meghwar tribe took a loan from TRDP and 20 Mahar families have also taken loans. Another source of loans is the carpet industry owner - they give loan to their workers, he never take profit on it. We take from*

*Rs. 30,000 to Rs, 100,000 and we work and pay back the loan in instalments. (FR, Malook Mahar, Tharparkar)*

*We are in debt, of Rs. 60,000 to Rs.100,000. A few families get items from grocery shops and return them money after a month. Twenty years ago people were not in debt and there was no inflation. Now everything is expensive: sugar, tea, flour and pulses. The size of families is also larger, so there are more needs and expenses as children want clothing, food, shelter, health and outgoing expenses etc. (FR, Sarh Bano, Tharparkar)*

In response to the changing climate and more extreme temperatures (heat in summer, cold in winter), many people said they tried to adjust by changing their work patterns, e.g. in summer starting outside work earlier and stopping earlier, staying indoors for the hottest parts of the day, and resuming work later in the evenings. In winter the opposite applies, starting later in the morning when it is a bit warmer.

*Weather is changing; earlier it was normal but now there is more rain, heat, cold...In summer we sit inside, and in winter we use firewood and dried dung to save ourselves from the cold...sometimes we have to buy wood which costs Rs. 400-500 per camel cart. (FR, Jam Babbar, Dadu)*

*In summer and extreme sunshine women sit inside, don't allow children to play outdoors, try to get them to sleep in the afternoon, and carry out their household chores and other activities in the shade. Almost all men and women complain of headaches due to extreme heat and sunshine. (FR, Muhabbat Jalbani Channa, Dadu)*

### **Livelihood Change**

Livelihood change to adapt/cope with the challenges posed by climate change/natural disasters was commonly observed among the study communities. This can entail changing practices within existing livelihoods and/or seeking completely different sources of livelihood. Examples of the former include planting different crops, using hybrid seeds/fertilizer to increase yields, and shifting to more 'hardy' livestock. Such measures are not always effective, e.g. hybrid seeds are supposed to increase yields but the effects of climate change on soil conditions are so overwhelming that yields remain sub-optimal.

*20-30 years ago we grew sugar cane and onions and now we grow cotton and chillies. And since the past 12 years we have been growing wheat. The seeds we used to use do not give us high yield, now we use DAB seeds, which give high yield. And*



*we use hybrid seeds, which give us high yields. 20/30 years ago we used desi( local) seeds and animal manure and had good crops. Now due to the illness in the crops...we use hybrid seeds more because these seeds are strong and their genes kill the other diseases of the crops. These hybrid seeds can also grow in 40 degrees centigrade, but if the temperature gets higher then these seeds die. (MR, Gujar Kot, Badin)*

*In the past rice was grown and we got 30-to 35 mds per acre, now due to the use of new hybrid seeds, we get 60 to 70 mds per acre. But in comparison to the last 20-30 years, now overall the crops are 60% less, because in the past the sea breeze was less and now the sea breeze destroys the crops (MR, Ali Patni, Thatta)*

*The numbers of livestock has fallen due to the lack of fodder, and in particular the cows have become scarce because they eat a lot of grass. So we keep more goats and sheep. (MR, Sarh Bano, Tharparkar)*

With regard to the latter - people looking for alternative sources of work - for males, this often entails seeking manual labour in agriculture, factories, construction, etc. (either locally or in large cities, even abroad in a few cases); others have set up shops, collect wood to sell, or have taken up fishing – though they face challenges due to limited availability of fish. The search for alternative work commonly requires migration – discussed below.

*In the past the villagers were dependent on livestock rearing, but because of the drought the livestock died, and then they began to work on agriculture, but because of the sea intrusion, and the rains, the land was damaged, and the crabs and fish have increased in the sea, so they turned to fishing, and became fishermen. (MR, Sheikh Kerio, Badin)*

*There is no alternative work for the males when we have no agricultural activity, but a few get factory work labour in the main towns – some go to Tando Allahyar and Tando Ghulam Ali to work in brick kilns. (FR, Mitho Kori, Badin)*

The shift from traditional to alternative sources of livelihood is extremely marked in some communities.

*We have stopped doing agriculture as we used to 20-30 years ago. Almost 80% of people go to Karachi and Hyderabad to the mills for daily wages, or to the factories. (MR, Sarh Bano, Tharparkar)*

*In the past 80% of people worked in agriculture, now 80% go to manual labour and migrate to other towns and do manual labour in the fields/harvests. (FM, Arniaro, Tharparkar)*

Among fishing communities, perhaps the biggest change in overall lifestyle is seen in Manchar Lake. People used to live on houseboats on the Lake, relying on fishing which provided a good source of income. There was a government school run out of a boat, and even health services were provided by boat to the fishing community living on the Lake. Generations of people lived in this way, but following flooding in 1976 and, even more, the deterioration in quality of water and fishing due to pollution, the locals have now moved onto land on the banks of the Lake. However, Manchar Lake inhabitants have been more resistant/faced greater difficulty than other communities in finding alternative sources of livelihood.

*We were born around water so it is not possible to live away from it, every Mallah will stay near the Lake as normally no Mallah wants to live away from the Lake because fishing is our main profession. (FR, Manchar Lake, Dadu)*

### **Migration**

As noted above, people often have to migrate in order to find alternative work. Such migration was particularly marked among agro-pastoral communities. Some said that male members migrated alone, particularly in search of work in large cities, but there were also many reported cases of whole families migrating, along with their livestock, to barrage areas of Sindh with water where manual labour was available. Such migration – in which some family members move to urban areas and others stay in rural areas - indicates a transition from purely rural to desakota (mixed urban/rural) livelihoods.

*When the crops fail we migrate to other areas, and it takes us one month to reach the barrage areas if we take the livestock with us. We have no choice: we have to migrate in order to survive. (MR, Besarno, Tharparkar)*

*We rely on livestock and agriculture but since last few years both have become difficult. So now the men are going to Sindh for industrial labour for three to four months, then they come back if it rains. Families who are poorer go with their entire family; in others just the males go for labour. (FR, Besarno, Tharparkar)*

*The men are daily wage labourers, who go outside the village to earn money. We women embroidery bed sheets and rillies,*

*but in a family, if there are four men, then three will go to earn in the cities. (FR, Sarh Bano, Tharparkar)*

It is important to highlight that the migration of male family members alone in search of work – while generating vital income for the household - places an additional burden on women, who have to take over some duties previously carried out by men, e.g. collecting fuel wood and grass. Seasonal migration among agro-pastoral communities was reported to increase the vulnerability of women, their dependency on other relatives and their workload. Male migration also places additional constraints on women’s mobility and access to services:

*Females are overloaded by work in the absence of males as they take care of children, go for collection of grass and fuel wood. (FR, Ali Khan Jamali, Badin)*

*In the absence of males women face hard time when they have to do all jobs along with care of outside chores like wood collecting and fetching water, and so on. (FR, Khalifo Hashim Soomro, Badin)*

*We are very poor: my husband was going to Karachi for labour (work) and he wanted Rs. 150 from me for the fare. As I have Rs. 150 I gave it to him. But I have eight children and they wanted food, so it was the worst time for me. (FR, Jamal Din Chandio, Badin)*

*Normally women get (increased) work load when males are away. They drop children to school, collect fuel wood and grass and drag it to home, which is normally responsibility of male head of the house. In absence of the male head, women request neighbourhood male member to help them to get hospital in time of illness. (FR, Haroon Samejo, Badin)*

### **Risk Reduction Measures**

People have also had to adapt to the greater risk of natural disasters: strong winds, typhoons, flooding and so on, by taking protective/mitigation measures. Some villagers reported raising the level of their houses, while others said they had built wooden houses to provide increased protection. (Figure 5.11). Often there was awareness of the need to carry out such protective measures – particularly in post-disaster housing reconstruction – but people were constrained from doing so by lack of funds. Flood affectees in Dadu said they had been provided alternative accommodation by the government for two to three months; thereafter, they had rebuilt their





**Figure 5.11:** Houses built on higher ground in Dadu.

own homes, but financial constraints meant these were 'katcha' (made of thatched bushes) and thus not resilient. Some people did build *pacca* wooden houses, but had to borrow money (Rs. 100,000-Rs. 200,000) to do so, creating problems of indebtedness. Fishermen have been forced to respond to the increased frequency and severity of cyclones by exercising greater care, e.g. moving their boats to safe areas until the typhoon recedes.

*A few of the villagers have made their houses on high plinths; they used some material (plastic sheets, straw and thatched bushes and bamboos) to strengthen their houses. (FR, Haroon Samejo, Badin)*

*To protect ourselves from natural disasters we build a mud ring around the houses, and we also raise the level of the houses to protect from rain and winds. (MR, Muhammed Saleh Lanjo, Tharparkar)*

## **Conclusion**

As seen there is a common perception existing among the study communities that the climate around them is changing, natural disasters are increasing in frequency and intensity, and natural resources are being eroded. As a consequence traditional sources of livelihood are seriously threatened and people's quality of life (access to food, water, health status and so on) has deteriorated. While communities in all agro-ecological zones are striving to find alternative

sources of livelihood, options are limited. What also clearly emerges from the discussions is that women suffer disproportionately: their already disadvantaged position in society is made much worse by the challenges posed by climate change.

### NOTES:

1. Naseer Memon, Zubaida Birwani, Degradation of Manchar Lake, A Case of Human Disaster, 2002, Shirkat Gah.
2. Mound abbreviated as mds. is a local measure of weight roughly equivalent to 40kg.
3. *Rilli* is a traditional quilt made by women in Sindh. It is made from small pieces of used / new cloths either torn or cut into geometric shapes.
4. It should be noted that the main form of livelihood for males in Juber Jee previously used to be highway robbery according to their own admission.
5. Watan Card is a government programme under which flood affectees are compensated for housing damage.



# 6

## Governance and Policy Environment

Environmental management policy in Pakistan, like everywhere else in the world is a hybrid of state institutions interacting with an increasingly vocal civil society. This chapter gives an overview of the policy institutions and relevant legislation at the international, national, provincial and ultimately local scales. The attention will not just be towards state institutions, important as they may be in terms of their legitimacy and efficacy, but also towards the emerging key civil society actors that not only influence state policy through their advocacy role, but also through their direct service delivery to locally vulnerable populations, e.g. Plan International, Oxfam, World Conservation Union (IUCN), World Wide Fund for Nature (WWF), Thardeep Rural Development Programme (TRDP) and National Rural Support Programme (NRSP) to name a few.

In terms of Pakistani state institutions, in the past decade there have emerged two parallel streams of institutions dealing with climate change related challenges—the ones that have traditionally had the resources and the legislative authority to substantively affect water and flood management, relief and developmental activities, e.g. the provincial revenue, irrigation and public health engineering departments, and then the recently created institutions—primarily at the behest of international donors, e.g. National Disaster Management Authority (NDMA), and Provincial Disaster Management Authority (PDMA), which have the visibility but little resources and even more tenuous legal authority for action. This report will discuss both types of institutions whilst examining their programming through a gender lens.

The chapter starts by reviewing state institutions and policies at national, provincial and district level. That discussion is then rounded off by a brief description of the key civil society players concerned with climate and disaster vulnerability. The chapter concludes by offering

some reflections on the existing institutional environment and its receptivity to gender concerns in environment and development related programming.

## **Institutional and Policy Environment**

Pakistan has long been affected by disasters, but the intensity and frequency of these has greatly increased in recent years. The traditional system for disaster management comprised a wide range of national, provincial and local level government entities. The inadequacy of this system, along with Pakistan's high vulnerability to disaster risk, was highlighted by the devastating October 2005 earthquake. In the wake of that disaster efforts were made to establish a dedicated disaster management structure focused not just on post-disaster rescue and relief, but also on disaster mitigation and preparedness. While progress has been made in this regard, the traditional system is also still in place and fully operational. The tensions inherent in having such a parallel set up undermine the effectiveness of disaster management efforts in Pakistan.

### **'Traditional' Disaster Management System**

As noted, this comprises a wide range of federal, provincial and local level government entities with varying degrees of responsibility in relation to disasters. The relevant legislation is primarily the National Calamities (Prevention and Relief) Act 1958, which provides for the maintenance and restoration of order in areas affected by certain calamities, damage assessment, and provision of relief and compensation. At federal level, the Emergency Relief Cell (ERC) in the Cabinet Division serves as the focal point during emergencies. At the provincial level, the ERC coordinates with provincial Relief Departments/Relief Commissioners who are responsible for effective distribution of relief items in respective provinces. ERC is also responsible for dealing with institutional donors and receives grants/donations/funds for distribution through the Prime Minister's Disaster Relief Fund. Under the Calamities Act revenue officials from provincial to district and tehsil levels are responsible for disaster management.

There are a number of other key 'specialized' agencies with roles in disaster management. The National Crisis Management Cell under the Ministry of Interior monitors emergencies in coordination with the Provincial Crisis Management Cells, and other security agencies. The Federal Flood Commission (FFC), under the Ministry of Water and Power, is responsible for coordinating flood impact mitigation,

prevention, preparedness and response in Pakistan. It works with provincial Irrigation Departments to implement flood mitigation measures such as construction of embankments. The Pakistan Meteorological Department (PMD) provides weather forecasts for agricultural development and disaster management purposes: it is responsible for communicating early warnings to relevant national and provincial stakeholders.

In addition to these 'specialist' bodies, in the event of an emergency – depending on the location and scale – almost all federal and provincial ministries/departments and line ministries (health, police, watsan, etc) are engaged in diverse aspects of disaster management and relief provision. Finally, the armed forces typically play a very significant role in disaster response – particularly in the initial rescue and relief phase.

There are a number of fundamental flaws in Pakistan's traditional disaster management system, which became glaringly apparent in the wake of the 2005 earthquake. One, numerous agencies and institutions are involved but there is no effective mechanism to coordinate or integrate their efforts. This invariably leads to duplication of efforts, a piecemeal approach, inefficiency, mismanagement, poor communication and so on. Secondly, the focus has primarily been on disaster *response* – handling a crisis once it happens – rather than on risk reduction, mitigation and preparedness. Given the increasing frequency and intensity of disasters in Pakistan, and the devastating effects of the 2005 earthquake, there was recognition of the need for change.

### **Post-2005 Disaster Management System**

Even prior to the October earthquake, in January, Pakistan had become signatory to the UN Hyogo Framework for Action (HFA) 2005-2015: Building Resilience of Nations and Communities to Disasters. The HFA establishes the foundation for a national risk reduction system, whereby risk reduction is incorporated into national development policies and programs. The establishment of such a system in Pakistan was effectively prompted by the 2005 earthquake that wreaked such havoc in the north of the country (in particular Azad Kashmir and NWFP – since renamed Khyber Pakhtunkhwa).

The 'new' system has at its apex the NDMA. The 2006 National Disaster Management Ordinance set up the NDM Commission with responsibility for oversight and guidance on disaster risk management, and it in turn established the NDMA. The NDMA was to serve as a focal point and coordinating body for disaster risk management (DRM). In the event of a disaster, all stakeholders – government, armed forces,

civil society, international donors – were to work through the NDMA. Other functions of the NDMA include providing technical guidance and capacity building support to national, provincial and local stakeholders; mapping hazards and conducting risk analyses; and setting up a National Disaster Management Fund.

Provincial Disaster Management Authorities (PDMAs) were subsequently set up in all four provinces, and provision was made for establishment of District Disaster Management Authorities (DDMAs). The PDMAs and DDMAs have corresponding functions to the NDMA: serving as the provincial and district focal points respectively to coordinate disaster preparedness and response efforts. However, unlike the NDMA, both the PDMA and DDMAs also have a direct implementation role in relation to disaster management. DDMAs in particular are responsible for issuing disaster warnings to communities, as well as raising community level disaster management awareness and building their capacity for rescue and response work.

The NDMA formulated the National Disaster Risk Management Framework (NDRMF), which identifies nine priority areas for action: institutional and legal arrangements, assessment and planning, education and awareness, local level risk reduction, preparedness and mainstreaming DRM into development. The NDRMF was followed by the National Disaster Risk Reduction Policy covering both natural and human induced disasters and aimed at minimizing vulnerability to hazards. The 2010 National Disaster Response Plan (NDRP) – prepared in the wake of the unprecedented flooding disaster that year - defines the responsibilities of diverse stakeholders in the event of an emergency and lays out standard operating procedures. The 2012 National Disaster Management Plan (NDMP) identifies the roles and responsibilities of stakeholders, including federal, provincial and district governments, community organizations, NGOs, businesses and residents who are involved in disaster management. It is also relevant to mention that the 2012 National Climate Change Policy provides a framework for coping with the threats posed by climate change through adaptation and mitigation measures. The policy focuses on sectors such as water resources, agriculture and livestock, forestry, human health, disaster preparedness, transport and energy.

The PDMAs have their own strategies and plans. Sindh PDMA developed a 2008 Disaster Risk Management Plan, which lays out the roles and responsibilities of different line departments involved in disaster management. The 2013 Multi-Hazard Contingency Plan

details the responsibilities of numerous departments – health, education, irrigation, police, revenue, etc – before, during and after disasters. Some DDMA in Sindh, including Badin, Dadu and Thatta, have prepared disaster contingency plans with the support of UNDP.

Following the passage of the 18<sup>th</sup> Constitutional Amendment, responsibility for almost all service delivery functions was devolved to the provinces. Consistent with this, most of the powers of the NDMA were devolved to the PDMA and the federal Ministry of Environment was disbanded. However, in recognition of the need for some federal level entity to be responsible for environmental issues, the Climate Change Division was subsequently set up under the Cabinet Secretariat. The NDMA reports to the Climate Change Division, while the PDMA report to provincial Rehabilitation Departments.

### **Challenges**

While the institutional and policy framework for disaster risk management in Pakistan has been developed, this is far from being fully translated into practice. The NDMA and PDMA are operational, but many DDMA are yet to be established. To varying extents DMA at all levels face capacity and funding constraints: the NDMA is probably the best resourced and has the greatest capacity; PDMA have inadequate budget allocations and their capacity is undermined by the constant transfer/turnover of staff characteristic of provincial bureaucracy; the DDMA are effectively simply a grouping of local officials with other responsibilities (e.g. Deputy Commissioner) – at best they have one full-time member (funded by donor agencies) – and have no allocated funds in district budgets. [Since they comprise of departmental and other representatives they are not treated as a separate unit.] The ability of these bodies to carry out their assigned functions - and implement the impressive array of policies and plans that have been formulated - is correspondingly extremely limited.

An equally fundamental issue is that the ‘traditional’ system of disaster management is still functional, and has much greater capacity (funds, personnel, outreach) than the new system. Moreover, in many ways it is treated as more authoritative by relevant stakeholders. For example, even the Sindh PDMA does not appear to have a clear line of communication with DDMA (where these exist): disaster alerts and warnings are passed to the DC office, which disseminates these as the *DC office* rather than as the DDMA focal point. As illustrated by this example, the continuing existence and predominance of traditional disaster management systems greatly undermines any efforts to



establish a new system. Furthermore, the existence of parallel structures actually exacerbates the challenge of ensuring coordination between multiple entities involved in disaster management across multiple tiers. A related issue is that the focus of disaster management efforts in Pakistan continues to largely be on disaster response – handling a crisis when it happens – rather than on risk reduction.

All these problems were apparent in the far from optimal handling of the 2010 floods disaster that devastated large parts of the country – notably Sindh. Lack of government support for poor communities was a persistent complaint heard in the focus group discussions for this study (see Chapter 5).

### **Non-Government Entities**

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The shortcomings in disaster management on the part of the state in Pakistan are offset, to some extent, by the efforts of civil society – local, national and international NGOs – and international donor agencies. Following the 2005 earthquake, such organizations – as well as countless individuals – provided vast amounts of relief assistance to affected communities, along with supporting early recovery and reconstruction efforts.

Just as the 2005 earthquake led to recognition within government of the need for a dedicated, coordinated disaster management system, so it led to a shift in emphasis within the donor/NGO community from pure relief and disaster response, to disaster risk reduction and preparedness. Subsequently, a number introduced programmes at national, provincial and local level, raising awareness, and building the capacities of relevant stakeholders, including the NDMA, PDMAs, DDMA and community groups.

The persistent shortcomings in government disaster management (described above) mean that NGOs/donors continue to play a significant role in disaster response. Five years after the October 2005 earthquake, during the 2010 floods disaster, again a broad range of NGOs/international organizations worked to provide emergency relief support to affected communities across the country. This included clean water and water purification kits, food, kitchen sets, and shelter items, sanitation kits, hygiene supplies, medical supplies, doctors, mobile and basic health care units. Some organizations established child-friendly and women -friendly areas in camps. Numerous respondents in the focus group discussions acknowledged the support they had received in times of disaster/hardship from NGOs, including

for housing reconstruction (see Chapter 5). So although NGOs play an important role in disaster response, they should move beyond providing relief and rehabilitation, to long term sustainable initiatives with the communities.

Notable among international organizations supporting disaster response in Pakistan are the UN System, Plan International and Oxfam. In recent years the UN System has played a leading role in all phases of disaster response: relief, recovery and reconstruction, as well as in strengthening institutions and building capacity for disaster management at all levels. The focus of Plan International is on community/village level; it is currently working in 36 districts of Sindh and Punjab on child centred disaster risk reduction. Through an MOC (Memorandum of Cooperation) with NDMA, Oxfam is working to minimize disaster risk at district and community levels. Under its DRR program Oxfam helps communities in developing contingency plans, early warning systems, evacuation practices and adaptation to the changing environment. Worldwide Fund for Nature (WWF) and the World Conservation Union (IUCN) play a major role in environmental conservation.

Among national/local NGOs, in Sindh, NRSP and even more the Thardeep Rural Development Programme have been prominent in assisting local communities to recover in times of hardship, including assisting in livelihood restoration. Again and again in the focus group discussions, people described support they had received from TRDP. Other national/local NGOs involved in disaster relief (and to a lesser extent preparedness/capacity building) are PIEDAR, Pattan, Taraqiati Tanzeem, Sungi Foundation and Strengthening Participatory Organizations (SPO).

While the role of donors/NGOs is commendable, there are a number of issues with this. The major one is resource mobilization. Even for the UN System, it is often problematic raising funds to respond to large-scale disasters; NGOs – international and national/local – face even greater challenges in this regard. It is also important to note that climate change leading to higher frequency/intensity of natural disasters is a global phenomenon – which means ever more pressing competing demands for INGO/donor support. The second is sustainability. Donor programs typically have a life-cycle of a few years; NGO support lasts as long as funding availability. In the focus group discussions, many people highlighted the fact that relief provided by NGOs, e.g. food rations, were only given once/handful of

times – thereafter they had nothing. A third challenge is image, credibility and acceptability to local communities. The donor/NGO sector in Pakistan has become associated, to some extent, with an agenda of liberalization/ Westernization. This can undermine their ability to operate in some parts of the country.

All of these issues point to the need for a strengthened and effective state disaster management system, which should serve as the primary provider of support for all aspects – risk reduction, mitigation, preparedness and response – of disaster handling. The state system should be supplemented by ‘external’ (NGO/donor) assistance as needed rather than be dependent on the external actors.

### **Gender Mainstreaming**

Numerous studies - including this one - provide evidence of the disproportionate burden of climate change and disasters on women (and children). The qualitative information detailed in Chapter 5 clearly shows, firstly, the already disadvantaged position of women in the study communities, and secondly, the greater suffering and hardship borne by women in the wake of climate change/disasters. All of which points to the need for gender sensitive disaster management policies and programs.

The existing disaster management framework in Pakistan includes gender to a very limited extent. With regard to policies, the Hyogo Framework provides for gender sensitive policies and strategies in a humanitarian response. The NDMA and PDMA Sindh have developed gender-mainstreaming guidelines to address the social vulnerability factor in disaster management.

In 2010 the NDMA established a Gender and Child Cell (GCC) with the support of UN Women. The Cell is supposed to recognize and respond to gender issues and vulnerability aspects, through policy formulation, training and dissemination of gender guidelines to all DMA staff. Between April and July 2013, the Gender and Child Cell organized provincial and regional consultations with key stakeholders including PDMAs and some selected DDMA, local NGOs and relevant government departments. The meetings focused on the policy formulation for mainstreaming needs and concerns of the vulnerable groups, including women. The group’s recommendations were consolidated and synthesized in the form of policy guidelines. In practice, however, gender concerns remain neglected in disaster

management initiatives, particularly at local level. As noted above, NGOs and INGOs/donors are to varying extents emphasising women in their programs and initiatives. Overall, however, much more effort is needed to mainstream gender into disaster management in Pakistan.

## **Conclusion**

Despite facing a number of very large-scale natural (and other) disasters in recent years, and despite recognition of the need for a coordinated disaster management system focused on risk reduction and preparedness as well as disaster response, Pakistan's ability to effectively manage disasters remains weak. The attempt to introduce a new (donor-driven) DM structure comprising NDMA, PDMA and DDMA has been undermined by resource and capacity constraints, as well as the persistence of established systems – Provincial Relief Commissions, Deputy Commissioners, etc - for disaster management. Numerous policies and plans have been formulated addressing risk reduction as well as emergency response, but in the absence of strong implementing bodies, they are far from being translated into practice. Against this backdrop, it is not surprising that the specific and pressing needs of women in disaster situations have been neglected.



## Key Recommendations and Conclusion

During the course of the field work for this report, in the village Nebaro Yousuf, district Tharparkar, we asked one of our local field researchers (RA) to lead the focus groups discussion for that day. The local researcher was not quite sure if he felt confident enough to lead the discussion even though he had seen us lead many others in other communities. The participants were listening in, and one of them asked the RA in Sindhi, if he was a local. They assumed that our Karachi based team did not speak Sindhi, which it did. Upon finding out that he was indeed a local, they said to him:

“Young man, what are you doing going around with these [NGO type] people? They will keep parroting away climate change, and won’t do anything beyond. Your life will just go by chasing after this [climate change mirage].” (male FGD participant, Nebaro Yousuf, district Tharparkar)

The above quote is quite indicative of what the climate change agenda has come to mean for many of the local populations in rural Sindh. The local communities are frequently approached by NGOs doing research (often on climate change related issues, like us) or providing relief in the aftermath of disasters. Climate change by most stakeholders internationally and nationally is understood through the idiom of the high science of climate. That universalist scientific packaging of climate change is then conveyed by the votaries of the ‘development’, ‘adaptation’ and ‘disaster risk reduction’ enterprises to subnational actors, and local level communities as a global challenge to be responded to at the local level. But as the evidence in this report has hopefully highlighted, the very urgent present of the survey respondents and communities is defined by extremes of deprivation, marginalization, injustice and violence, particularly along gender lines. Their lives are not static but have undergone profound transformations partially at the hands of physical changes in their environment but more noticeably through the socio-economic changes borne of urbanization, modernization, and technological and demographic changes. In their context then climate change articulated as a future bio-physical

threat, quite obviously rings a little hollow. Our approach towards climate change outlined in the introductory chapter of treating climate change as a question of present day vulnerabilities is to address this question of relevance.

We took very seriously the politico-cultural valence of the local idiom through which, climatic changes are being understood and being responded to in rural Sindh. Women describing climate change and accompanying hazards as a consequence of human wickedness are not so far off the mark, in our view. Anybody can tell us that climate change is indeed an outcome of energy use and consumptions patterns and those patterns are based upon unspeakable exploitation of weaker human beings, and the non-human world. In the modern parlance those patterns might be unsustainable, unethical or unjust, but describing them as downright wicked is also not unreasonable. In our narrative of the gendered vulnerability in rural Sindh we have tried to extend that respect to local analytical insights in local idioms and we maintain that national and international policy could do well to listen to these voices.

Overall the survey households and communities were found to be highly vulnerable with very limited adaptive capacity. The tools used to assess the vulnerability and adaptive capacity of the study communities and households also illuminate the drivers of vulnerability. Some of the recommendations outlined below will be useful in addressing some of those drivers of vulnerability and limited adaptive capacity.

The VCI tool has given us a reasonably credible picture of the geography of social vulnerability and its drivers at the intra-community level, and then also at the inter community level. We learn that stability of income, quantum of assets and social capital are the key factors that describe the variance in the household level vulnerability scores. At the inter-community level the quality of infrastructure along with overall educational attainment of the community are two of the largest drivers of variance in community level VCI scores.

With regard to the VCI tool itself it does a very good job of highlighting gendered aspects of vulnerability at higher and extreme levels of vulnerability, while it does tend to hide gender dynamics of vulnerability when the VCI score is low. It is therefore imperative that the tool be used in conjunction with qualitative information and not instead of it, especially if the interest is with gendered vulnerability.

The focus group discussions outline how changes in climatic patterns are already being experienced by communities and the consequences of those changes are largely negative and very rarely positive. The qualitative information highlights how women are bearing the brunt of the changes being precipitated by socio-economic and bio-physical changes in the shape of increased work loads, lower nutritional intake, more restricted access to health

care, greater conservatism and lesser mobility. There are a few positive changes as well in certain communities, in terms of greater autonomy at times, access to education and lesser workload because of availability of commercially produced food and utility items.

The gendered negative impacts are also borne by the men. They are not exactly in a happy situation of being migrant laborers, at times undertaking back breaking work for paltry salaries, far from home, familiar environments and loved ones. The psychological impacts of loneliness borne of migration and also vulnerability to ethnic and class based violence in cities like Karachi for the migrant male laborers can also not be under estimated.

The institutional environment for managing adaptation to climate change in Pakistan remains fragmented and relatively ineffectual. The governmental institutions fall in two parallel streams: the older institutions that have the budgets and legal mandate to [somewhat indirectly] tackle climate related challenges, e.g., revenue, and irrigation departments at the provincial levels and the FFC, WAPDA, PMD and the military at the federal level; and the purpose built newer institutions that however, have ambivalent and overlapping legal authority and virtually no budgets to do their jobs, e.g., NDMA, PDMA, DDMA, and Climate Change Division. The state institutional set up has to adapt to the challenges of climate change, but at the moment that adaptation seems to be at a cosmetic level, through the creation of these new institutions while the real power continues to reside in traditional ministries and departments.

At the legislative and policy level, the GoP continues to have legal and stated commitment to mainstreaming gender in its climate and environment related policies. In reality though there is very little understanding or internalization of gender issues. It is always tacked on almost as an after thought and then too as something to do with women alone in every policy document. But there is little understanding and perhaps even sympathy towards how to mainstream it. Topically too, the climate change policy for example purports to do everything under the sun towards climate adaptation and mitigations. But precisely because the policy has no discernable boundaries, i.e., what is it not going to do, it is almost certain that it won't be helpful in accomplishing any of the vast number of things that it sets out to do.

In light of the above general conclusions some of the following recommendations suggest themselves.

### **Addressing drivers of vulnerability**

The study found quality of infrastructure and overall educational attainment of the community to be the largest drivers of variance in community level VCI scores. Given this:



- The provincial government needs to pay particular attention to infrastructure development (both economic and social) in remote areas, especially provision of clean drinking water, education and healthcare facilities and a sound road network. However, the focus in provision of education should not just be on the number of children educated but also on the quality of education, to avoid the type of perverse gender status outcomes highlighted in this report.
- Traditional health care should be promoted and reproductive health support (e.g. dais in rural Sindh) to overcome the mobility (in the absence of migrant male workers) and cost restrictions women face in accessing distant [somewhat] modern health care. Local [reproductive] health workers should be trained to a standard where they can provide basic, affordable health care locally, accessible by women in confidence and with dignity.

### **Adaptation approaches (differentiated for agro-ecological zones)**

Overall the survey households and communities were found to have very limited adaptive capacity mainly due to lack of financial resources and relevant knowledge. This needs to be addressed, particularly among agro-pastoralist and fishing communities which have greater vulnerability, by promoting climate adaptation and resilience based upon present day stresses:

- Existing types of adaptation highlighted in the report can be replicated and supported by the government. Examples include construction of flood protection walls and changes in house construction in a couple of villages (e.g. making wooden houses that are easy to dismantle in the event of sea intrusion rather than brick and RCC houses).
- Specific programming for fishing communities should be carried out to make their fishing livelihoods more sustainable. This would not only help this highly vulnerable group, but will also help resurrect the relatively egalitarian gender ethos that was prevalent in these communities.
- For agro-pastoralist communities focus should be on provision of mobile veterinary services for these communities. Animals are the main form of savings for these communities and veterinary services could help in preserving those savings as buffers against environmental stress.
- Farmers should be supported by agriculture extension departments, e.g. providing timely advice about changing crops and cropping patterns. The capacity of farmers could also be enhanced through on-ground trainings. Some pilot projects could be initiated for crop adaptation.

### **Gender specific interventions**

- To increase gender mainstreaming, gender sensitization and training should be conducted with provincial government representatives to ensure gender issues are integrated into the initial planning of projects and programmes.
- Women should be provided with skill training to increase their capacity to explore alternate sources of income generation. In addition to the provision

of veterinary services, women should also be provided with information and training to develop basic veterinary skills to manage livestock, as long as that does not inordinately contribute to their already high work load. This needs to be coordinated by the relevant provincial government departments, and local leadership in the communities.

- More research needs to be conducted on issues of male migration in search of work, and the impact of these changes on both women and men: the stress women face in being forced to cope alone, and the pressures and psychological effects of displacement and isolation on men. This will allow design of specific interventions tailored towards addressing the women's workload issue in the absence of males, and stresses faced by migrant workers.
- Post-disaster effects on women who are forced to relocate for several weeks during floods or drought, need to be examined, to create safe spaces for them, so that they can cope with the tension and psychological stress of disaster situations.
- Social safety nets, particularly Benazir Income Support Program (BISP) has reasonable coverage at the national level for providing cash transfers to the poor and needy women. However, there is ample scope for expansion of its coverage and up-scaling the amount of monthly stipend. The database of BISP can also be used for vocational and skill training for women.

### **Institutional set-up for responding to climate change challenges**

- Given the lack of effectiveness of the 'parallel' structures (traditional system and 'new' dedicated structure of NDMA, PDMAs, etc) currently in place, the DM system needs to be revamped with enhanced integration among relevant departments and provision of adequate funding for disaster management authorities.
- Provision of support to farmers by agriculture extension departments was listed above. In addition, strong coordination was called for by the communities between the meteorological department and agriculture extension department.
- Early warning systems should not be limited to floods or disasters: these should also inform farmers about extreme heat and changes in the climate and weather patterns. This will help them to adapt and develop coping mechanisms (with assistance from agriculture extension staff).
- There should be provision for early warning in vernacular languages and in understandable format, through mobile phones if possible. There is a reasonably high penetration of mobile phones in the field area, even though the women do not have as much access to them as possible. Even then, even if few women have access to them and they can receive understandable hazard warnings, they could be much better placed to warn others in the community. The warning systems at present are wholly inadequate and gender biased.

### **Use of VCI as a planning tool and further research**

The VCI yields credible variations in vulnerability scores across households and communities, which are very useful in mapping the geography of vulnerability across space. Given this:

- The VCI tool could be usefully incorporated in the workings of state institutions. The lowest revenue officers in the Pakistan state hierarchy, Patwaris, could be trained in the use of the simple instrument to collect and regularly update vulnerability related information about households and communities. Patwaris would be suitable since the digitization of land revenue records is steadily diminishing the time spent on their traditional work of land revenue assessment.
- The VCI scores could be made available to the DDMA, which have the collection of this information as their core activity. At the moment those DDMA are not very functional. Using this vulnerability information the DDMA could direct relief aid more effectively in the aftermath of a disaster. The same information could also be useful for the Deputy Commissioners who are the executive and judicial heads at the district level. At provincial level, VCI information could help in better planning of the PDMA as well as the provincial revenue departments.
- The lack of significant difference in VCI scores between saline and fresh groundwater, canal irrigated communities is surprising. It points towards the importance of geography beyond the generalization of agro-ecological zone in determining vulnerability on the one hand. On the other hand the lack of significant difference also suggests greater and deeper analysis of the existing data and perhaps collection of additional data to find the contrasts in vulnerability and its drivers across the two agro-ecological zones.

The above list of recommendations is not comprehensive or exhaustive by any means. These recommendations are indicative of the types of directions that developmental and adaptive interventions could take. There are tales of incredible suffering and deprivation in this report, but there are also equally interesting stories of adaptation in the face of change. The challenge is to support the ingenuity and resourcefulness, of both men and women to negotiate the challenges they are facing and will face. Climate change is not a future challenge, it is yesterday's news in rural Sindh. The edifice of climate adaptation and resilience will have to be built upon resilience to the present day stresses. Some of the research tools and insights offered in this report hopefully provide pathways to mitigating gendered vulnerability in the here and now, so that the future can be met from a position of strength instead of vulnerability. The man in Nebaro Yusuf was right—but he doesn't have to be.

# Annexures

RURAL COMMUNITY LEVEL VCI			
Particular		Vul	Cap
<b>A Material Vulnerability</b>		<b>30</b>	
<b>1. Income Source: Start Value</b>		<b>8</b>	
o Start value represents dependency of 100% of households on local level asset for livelihood.			
o Add 2 to the score if majority of livelihood sources are unstable. [Agriculture and associated income, daily wage work - both temporary and seasonal are considered as unstable sources of livelihood]		+2	
o Subtract 2 if the income source reported by more than 50% of households are stable and insensitive to local hazard [Agriculture, livestock, and daily wage with in the village sensitive to local hazard]			-2
o Lower score by 1 for every 10% households reporting non local income. [Professional government jobs and private jobs in other cities not daily wage are considered as non-local income]			-1 per
<b>2. Educational Attainment: Start Value</b>		<b>5</b>	
o Start value represents a community illiteracy rate of more than 75%.			
o lower score by 1 for every 10% increase in male literacy			-1 per
o lower score by 2 for every 10% increase in female literacy			-2 per
<b>3. Assets : start value</b>		<b>5</b>	
o Start value represents no collectively owned community assets.			
o Lower score by 1 for productive collective community assets with open access to community members.			-1 per
<b>4. Exposure: start value</b>		<b>10</b>	
o Start value represents a community with 50% or more of its households located in high likelihood impact area relative to the prime hazard (for example, 50% of households are located within the 10-year floodplain).			
o Lower the score by 1 for every 10% decrease in the proportion of households located in a high impact likelihood area.			-1 per
o Lower score by 1 for every 10% of households that have implemented some sort of hazard mitigation.			-1 per
<b>Categorization of Hazard</b>			
Very High – No Score (0)   High – Lower score by 2   Moderate – Lower score by 4			
Low – Lower score by 6   Very Low – Lower score by 8			
<b>B. Institutional Vulnerability</b>		<b>50</b>	
<b>5. Social Network: start value</b>		<b>10</b>	
o Start value represents no evidence of equitable, democratic community organizations [the concept is entirely self help - Government, NGOs and INGOs help and development works are not considered]			
o For each community organization reported to have helped community members, lower the score by 2 times from the proportion of respondents believing the organization to be equitable and democratic.			-2x (prop) per

Particular	Vul	Cap
<b>6. Extra-local Kinship Ties: start value</b>	<b>5</b>	
o Start value represents less than 20% of community households reporting extra local kinship ties.		
o Lower score by 1 for every 20% of households reporting extra-local kinship ties.		-1 per
<b>7. Infrastructure: start value</b>	<b>16</b>	
o Start value represents lack of clean water, telecommunications, electricity, good roads and healthcare.		
o Lower score by 4 if primary access roads are all-weather OR		-4 or
o Lower score by 2 if the primary access road is seasonal. [In case All-Weather Road does not exist, and accessibility is seasonal.]		-2
o Lower score by 2 if 75% of households have access to clean water. [If distance is more than 1 Kilometer, then no score]		-2
o Lower score by 2 if 75% of households have electricity. [No matter if the electricity connection is via Kunda (Illegal)]		-2
o Lower score by 4 if community has robust telecommunications.		-4
o Lower score by 4 if the community has medical facility.		-4
<b>8. Warning Systems: start value</b>	<b>4</b>	
o Start value represents lack of a warning system. [Warning system should be a proper warning system - mobile messages and radio can be considered by discounting]		
o Lower score by 2 if warning system exists. [If between 25% and 50% then lower score by 1; If 50% and above then lower score by 2]		-2
o Lower score by additional 2 if extant of warning system is known and trusted by 75% of households or more. [If between 50% and 75% then lower score by 1; If 75% and above then lower score by 2]		-2
<b>9. Community Unemployment and Dependency: start value</b>	<b>10</b>	
o Start value represents unemployment of more than 50%.		
o lower score by 1 for every 10% drop in unemployment		-1 per
<b>10. Community majority of disadvantaged lower caste religious or ethnic minority</b>	<b>5</b>	
<b>C. Attitudinal Vulnerability</b>	<b>20</b>	
<b>11. Sense of Empowerment: start value</b>	<b>10</b>	
o Start value represents limited attitude of self help and lack of access to regional or national leadership structure		
o Lower score by 5 if attitude of self help is pervasive or community leadership has access to regional leaders. [If between 25% and 50% then lower score by 2; If 50% and above then lower score by 5]		-5
o Lower score by additional 5 if community leaders have access to national leadership [If between 25% and 50% then lower score by 2; If 50% and above then lower score by 5]		-5
<b>12. Knowledge: start value</b>	<b>10</b>	
o Start value represents lack of collective knowledge about potential hazards.		
o Lower score by 1 for every 10% of respondents that accurately describe the primary hazard(s) and their potential impacts		-1 per
<b>Total Vulnerability Score</b>	<b>----</b>	
<b>Total Capacity Score</b>		<b>----</b>
<b>Combined vulnerability and capacity score</b>	<b>----</b>	
<b>Highest possible vulnerability and capacity score</b>	<b>100</b>	

RURAL HOUSEHOLD LEVEL VCI			
Particular		Vul	Cap
<b>A Material Vulnerability</b>		<b>30</b>	
<b>1. Income Source: Start Value</b>		<b>10</b>	
o Start value represents dependency of 100% on local.			
o Add 2 to the score if the income sources are unstable (for example, daily labor) [Agriculture and associated income, daily wage work - both temporary and seasonal are considered as unstable sources of livelihood]		+2	
o Subtract 2 if the income sources are stable and insensitive to local hazard. [Agriculture, livestock, and daily wage with in the village sensitive to local hazard]			-2
o Lower score by 1 for every 10% of non-local income reported. [Professional government jobs and private jobs in other cities not daily wage are considered as non-local income]			-1 per
<b>2. Educational Attainment: Start Value</b>		<b>5</b>	
o Start value represents no member of household being literate.			
o Lower score by 1 for every 5 years of schooling of the most educated male member of the household.			-1 per
o Lower score by 2 for each female member's 5 years of schooling.			-2 per
<b>3. Assets : start value</b>		<b>8</b>	
o Start value represents no immediately fungible assets (for example, farm implements, animals, jewelery, savings, household items)			
o Lower score by 1 for every Rs.40,000 of fungible assets. - will have to calibrated empirically			-1 per
<b>4. Exposure: start value</b>		<b>10</b>	
o Start value represents location in high likelihood impact area relative to the prime hazard (for example, household located within the 10-year floodplain).			
o Lower the score by 1 for every level of decreased impact likelihood between household location and high impact likelihood area (for example, subtract 1 for each 10-year floodplain delineation.)			-1 per
o Lower score by 1 or each instance of hazard mitigation (for example, building of a house on higher plinth for floods, low cost construction, which could be rebuilt with local resources).			-1 per
<b>Categorization of Hazard</b>			
Very High – No Score (0)   High – Lower score by 2   Moderate – Lower score by 4 Low – Lower score by 6   Very Low – Lower score by 8			
<b>B. Institutional Vulnerability</b>		<b>50</b>	
<b>5. Social Network: start value</b>		<b>10</b>	
o Start value represents no household membership in ethnic caste, professional or religious organizations. [the concept is entirely self help - Government, NGOs and INGOs help and development works are not considered]			
o Lower score by 1 for each organization a household member belongs to			-1 per
o For each organization that has provided assistance in the past, lower the score by 2 times the proportion of respondents reporting the organization to be efficacious.			-2x (prop) per

Particular	Vul	Cap
<b>6. Extra-local Kinship Ties: start value</b>	<b>5</b>	
o Start value represents no extra local kinship ties ties.		
o Lower score by 2 for every immediate family member living extra-locally.		-2 per
o Lower score by 1 for every non-immediate family member living extra-locally.		-1 per
<b>7. Infrastructure: start value</b>	<b>16</b>	
o Start value represents lack of clean water, telecommunications, electricity, good roads and healthcare.		
o Lower score by 4 if primary access roads are all-weather OR		-4 or
o Lower score by 2 if the primary access road is seasonal. [In case All-Weather Road does not exist, and accessibility is seasonal.]		-2
o Lower score by 2 if 75% of households have access to clean water. [If distance is more than 1 Kilometer, then no score]		-2
o Lower score by 2 if 75% of households have electricity. [No matter if the electricity connection is via Kunda (Illegal)]		-2
o Lower score by 4 if community has robust telecommunications.		-4
o Lower score by 4 if the community has medical facility.		-4
<b>8. Warning Systems: start value</b>	<b>4</b>	
o Start value represents lack of a warning system or warning system that the HH is not aware of or does not trust. [Warning system should be a proper warning system - mobile messages and radio can be considered by discounting]		
o Lower score by 4 if warning system exists and is trusted.		-4
<b>9. Earning members in a household: start value</b>	<b>5</b>	
o Start value represents a household consisting of only one earning member.		
o Add 5 to score if single-parent headed household.	+5	
o Lower score by 1 for every additional earning member		-1 per
<b>10. Membership of disadvantaged lower caste religious or ethnic minority</b>	<b>+5</b>	
<b>C. Attitudinal Vulnerability</b>	<b>20</b>	
<b>11. Sense of Empowerment: start value</b>	<b>10</b>	
o Start value represents no participation in or access to leadership structure at any level.		
o Lower score by 5 if household is self declared community leader and / or has declared active participation in community decision making.		-5
o Lower score by 5 if household has declared access to regional or national leadership structure		-5
<b>12. Knowledge: start value</b>	<b>5</b>	
o Start value represents lack of knowledge about potential hazards.		
o Lower score by 1 for every type of hazard and related potential impacts accurately listed by respondents.		-1 per
<b>Total Vulnerability Score</b>	<b>----</b>	
<b>Total Capacity Score</b>		<b>----</b>
<b>Combined vulnerability and capacity score</b>	<b>----</b>	
<b>Highest possible vulnerability and capacity score</b>	<b>100</b>	



DISTRICT BADIN				
S. No.	District	Taluka	Union Council	Village
1.	Badin	Badin	Bhugra Memon	Sheikh Keerio
2.	Badin	Badin	Khadhan	Ibrahim Shah
3.	Badin	Badin	Seerani	Haroon Samejo
4.	Badin	Badin	Abdullah Shah	Hashim Soomro
5.	Badin	Tando Bago	Khairpur Gambo	Warshi Kohli
6.	Badin	Tando Bago	Dai Jarkas	Gul Muhammad Ahmadani
7.	Badin	Tando Bago	Khalifo Qasim	Haji Ahmed Buledi
8.	Badin	Tando Bago	Chhabralo	Ali Khan Jamali
9.	Badin	Shaheed Fazil Raho (Golarchi)	Ahmed Rajo	Mohd Yameen Jat
10.	Badin	Shaheed Fazil Raho (Golarchi)	Khorewah	Jamal Din Chandio
11.	Badin	Shaheed Fazil Raho (Golarchi)	Kario	Wali Mohammad Nizamani
12.	Badin	Matli	Halepota	Haji Abdullah Halepota
13.	Badin	Matli	Phalkara	Fateh Muhammad
14.	Badin	Matli	Ghulam Shah Laghari	Gujar Kot
15.	Badin	Talhar	Rajo Khanani	Mitho Kori
DISTRICT DADU				
S. No.	District	Taluka	Union Council	Village
1.	Dadu	Mehar	Khan Jo Goth	Haji Panah Gaincho
2.	Dadu	Mehar	Fareedabad	Ali Bux Tewna
3.	Dadu	Mehar	Kolachi	Sultan Bhatti
4.	Dadu	Mehar	Nao Goth	Kamo Machi
5.	Dadu	K N Shah	Mitho Babbar	Umeed Ali Babbar
6.	Dadu	K N Shah	Burrira	Mathiyon Rahuja
7.	Dadu	K N Shah	Chorre Qambar	Mano Khan Chandio
8.	Dadu	K N Shah	Kakar	Khat Lashkar
9.	Dadu	Sehwan	Boobak	Haji Khairdin Mallah
10.	Dadu	Johi	Chinni	Khan Muhammad Mallah
11.	Dadu	Johi	Drigh Bala	Haji Faiz Muhammad Laghari
12.	Dadu	Johi	Kamal Khan	Sukhio Channa
13.	Dadu	Johi	Torre	Rajo Dero
14.	Dadu	Johi	Sawro	Jam Babbar
15.	Dadu	Dadu	Piaro Station	Juber Jee
16.	Dadu	Dadu	Siyal	Haji Jan Muhammad Khushik
17.	Dadu	Dadu	Yaar Muhammad Kalhoro	Mohabbat Jabani

<b>DISTRICT THARPARKAR</b>				
<b>S. No.</b>	<b>District</b>	<b>Taluka</b>	<b>Union Council</b>	<b>Village</b>
1.	Tharparkar	Chachro	Liplo	Ramlani
2.	Tharparkar	Chachro	Khensar	Chapar Khosa
3.	Tharparkar	Chachro	Chachro	Panpario
4.	Tharparkar	Chachro	Herar	Besarnio
5.	Tharparkar	Diplo	Kaloi	M Saleh Lanjo
6.	Tharparkar	Diplo	Bhitaro	Obhayo Chandio
7.	Tharparkar	Diplo	Dhabro	Dhondio Meghwar
8.	Tharparkar	Islamkot	Sonal Bah	Malook Mehar
9.	Tharparkar	Islamkot	Kehri	Peeluro
10.	Tharparkar	Mithi	Bhakuo	Chaho Rahiman
11.	Tharparkar	Mithi	Jorou	Sarh Bano
12.	Tharparkar	Mithi	Chelhar	Amji Jo Goth
13.	Tharparkar	Nagarparkar	Satidero	Neebaro Yousuf
14.	Tharparkar	Nagarparkar	Peelo	Arniaro
15.	Tharparkar	Nagarparkar	Nagarparkar	Mondro
<b>DISTRICT THATTA</b>				
<b>S. No.</b>	<b>District</b>	<b>Taluka</b>	<b>Union Council</b>	<b>Village</b>
1.	Thatta	Thatta	Sonda	Aaloo Taro
2.	Thatta	Thatta	Kalri	Jarokho Khaskheli
3.	Thatta	Mirpur Bathoro	Jhoke Sharif	Fateh Ali Jatoi
4.	Thatta	Keti Bunder	Keti Bunder	Ghulam Dhablo / Khoriyoon
5.	Thatta	Keti Bunder	Keti Bunder	Haji Ismail Jat
6.	Thatta	Sujawal	Belo	Haji Abdullah Ghoto
7.	Thatta	Kharo Chaan	Kharo Chaan	Ali Patnee
8.	Thatta	Mirpur Sakro	Ghulamullah	Haji Barosar
9.	Thatta	Mirpur Sakro	Haji Ghirano	Hasil Khan Rind
10.	Thatta	Mirpur Sakro	Buhara	Muhammad Amin Jat
11.	Thatta	Shah Bunder	Daulatpur	Jeand Zangejo
12.	Thatta	Shah Bunder	Jungo Jalbani	Hashim Mandhrio / Naseer M Shah
13.	Thatta	Ghorabari	Kotri Allah Rakhio	Ibrahim Bhatti
14.	Thatta	Ghorabari	Udaasi	Haji Muhammad Shah
15.	Thatta	Jati	Kar Malick	Ishaque Themore

**District Badin** Date of Shared Learning Dialogue: 31st January, 2013  
Venue: Aewan-e-Sahafat, Badin

S. No.	Name	Designation	Organization
1.	Makkal Shah	District Focal Person	Pakistan Fisher Folk Forum
2.	Hyder Ali	District Executive Manager	Health and Nutrition Development Society
3.	Razia Zahid	Project Coordinator	Family Planning Association of Pakistan
4.	Faiz Udhejo	President	Shama Development Association
5.	Abdul Qadir	District Officer	Social Welfare Department, Government of Sindh
6.	Zafar Khaskheli	Producer – RJ	FM Radio
7.	Abdul Ghaffar Khokar	DDO – NRSP	National Rural Support Program
8.	Qazi Tariq M.	President	Roshan Sindh Welfare Organization
9.	Shahbaz Khan	Coordinator	Roshan Sindh Welfare Organization
11.	M. Khan Samoon	President	Badin Development and Research Organization
12.	G. Rasool Memon	Assistant	District Disaster Management Authority, Government of Sindh
13.	Abu Bakar Sheikh	President	DDP
14.	Abdul Latif Zargar	General Secretary	Badin Press Club
15.	Kashif Hussain	Project Officer	Rahnuma - Family Planning Association of Pakistan
16.	M. Haroon Gopang	KTN News	KTN News TV
17.	Muslim Qureshi	Manager	Rahnuma - Family Planning Association of Pakistan
18.	Muhd. Abdullah	Kawish	SNDS
19.	G. Mustafa Jamali	President	Daily Kawish News Paper
20.	Ayesha Siddiqi	Student	-
21.	Khursheed Memon	Member Ex. Councilor	Pakistan Peoples Party
22.	Hamida Khaskheli	S.G.A Worker	S.G.A. Badin
23.	Dr. Najma Jonejo	Social Worker	Ex. District Councilor , Government of Sindh
24.	Khadim Talpur	President	Society for Science
25.	Prof. Abdullah Mallah	Ex. Principal Islamia College	Social Worker
26.	Mr. Abdullah	Finance Manager	Badin Development and Research Organization
27.	Abdullah Khan	Finance Officer	Badin Development and Research Organization

**District Dadu** Date of Shared Learning Dialogue: 22nd January, 2013  
Venue: Hotel Benazir Inn, Dadu

S. No.	Name	Designation	Organization
1.	Akbar Panhwar	Chief Executive	Gorakh Foundation
2.	Irfan Ali Soomro	Assistant Accountant	Johi Organization for Rural Development and Natural Disasters
3.	Gulan Bhand	President	S.E.C
4.	Mahboob Ali	Program Officer	Sindh Education Foundation
5.	Sabir Bhand	Secretary	Human Rights Forum
6.	Asma Faisal	Social Worker	Village Shadabad Organization
7.	Riaz Ahmed	Program Manager	Society for Environmental Actions, Reconstruction and Humanitarian Response
8.	Amjad Birhamori	Social Worker	Village Shadabad Organization
9.	Ali Damsaz	Bureau Chief	Sindh TV News

<b>District Dadu</b>		Date of Shared Learning Dialogue: Venue:	22nd January, 2013 Hotel Benazir Inn, Dadu
<b>S. No.</b>	<b>Name</b>	<b>Designation</b>	<b>Organization</b>
10.	Rizwan Mangi	District Reporter	Awami Awaz News Paper
11.	Abdul Razaque	Finance Secretary	Society for Environmental Actions, Reconstruction and Humanitarian Response
12.	Asiya Abbasi	Project Officer	Nari Development Organization
13.	Fahmeda	Member	Nari Development Organization
14.	Khadim Hussain	Coordinator	Women Empowerment & Development Organization
15.	Zahid Lashari	Coordinator	Village Shadabad Organization
16.	Mukhtiar Ahmed	Volunteer	Johi Organization for Rural Development and Natural Disasters
17.	Sabir Bhand	Sec. HRF Dadu	Human Relief Foundation
18.	Ghulam Shabir Kalhoro	Social Welfare	D.O.S.W
19.	Abdul Hakem Jamali	General Secretary	Social Awareness for Humanitarian and Environmental Resources
20.	Abdul Ghani	President	Social Awareness for Humanitarian and Environmental Resources

<b>District Tharparkar</b>		Date of Shared Learning Dialogue: Venue:	27th February, 2013 Baanhn Beli, Tharparkar
<b>S. No.</b>	<b>Name</b>	<b>Designation</b>	<b>Organization/Deptt.</b>
1.	Syed Sajjad	Project Manager	Research and Development Foundation
2.	Ghulam Mustafa	Team Leader	Research and Development Foundation
3.	Partab Shiv	Coordinator	Society for Conservation and Protection of Environment
4.	Malji	DDO-SW, Mithi	Sindh Wildlife Department, Government of Sindh
5.	Nandial	Administrator	District Development Association Tharparkar, Government of Sindh
6.	Irfan Ali Bhalai	District Coordinator	Sindh Rural Support Program
7.	M Umar Memon	Sub Engineer	Sindh Rural Support Program
8.	Muhammad Khan Marri	Manager Programs	Baanhn Beli
9.	Jhaman Das	District Coordinator	Baanhn Beli
10.	Madhu Valassai	Social Organizer	Participatory Village Development Program
11.	Mumtaz Nohrio	Journalist	Awaz TV News
12.	Shabbir Dharmani	Coordinator	Baanhn Beli
13.	Mohammad Ibrahim	Coordinator	Baanhn Beli
14.	Bilawal Mehar	SDP, Mithi	Sindh Police
15.	Bharoomal Amrani	Project Coordinator	Society for Conservation and Protection of Environment
16.	Hajiani Lanjo	Program Manager	Thar Welfare Organization
17.	Sultan Ahmed Siddiqui	Coordinator	Baanhn Beli

**District Thatta**Date of Shared Learning Dialogue:  
Venue:5th August, 2014  
Makli Gymkhana, Thatta

S. No.	Name	Designation	Organization/Deptt.
1.	Ghulam Hussain Khawaja	CEO	Sindh Radiant Organization
2.	Asif Ali Qureshi	District Education Officer	Education Department
3.	Ghulam Rasool Khatri	Field Coordinator	WWF-Pakistan
4.	Faiz Muhammad	Social Worker	Sindh Radiant Organization
5.	Abdul Ghafoor hejib	Chairman	Sindh Peace & Development Society
6.	Ibrahim Hejib	President	Shahkar Social Welfare Association
7.	Habibullah Ranto	General Secretary	Sindh Rural Development Society
8.	Muhammad Ali	Social Worker	-
9.	M Hassan Ketari	Member	Sindh Rural Development Society
10.	Rafia Komal	Female Coordinator	Sehatmand Sindh
11.	Aasim Soomro	LSU Head	Reform Support Unit, Government of Sindh
12.	Abdul Hafeez	Community Mobilizer	Children Global Network - Pakistan
13.	Abdul Jabbar Panho	DPC	Plan International
14.	Nasim Memon	Social Worker	-
15.	Zeeba	Social Worker	-
16.	M Khan	Program Officer	Islamic Relief
17.	Hajan Solangi	District Reporter	Daily Koshish
18.	Mansoor Jalalani	District Reporter	Daily Awami Soch
19.	Shoukar Zaur	District Coordinator	Marie Stopes Society
20.	Tahira Khuman	Social Mobilizer	Sindh Radiant Organization
21.	Sunehra Qureshi	Social Mobilizer	Sindh Radiant Organization
22.	Dr. Abdullah Keerano	DPO. HSS	National Rural Support Program
23.	K B Behrano	District Officer	Social Welfare Department, Government of Sindh
24.	Allah Jurio	Coordinator	Sehatmand Sindh
25.	M Razaque	Manager	Church World Service - Pakistan
26.	G M Khushik	Advocate	Pakistan Lovers Youth Organization
27.	Tahmil Ahmed	Finance Secretary	Active Citizen Forum
28.	Raja Qurban Halo	President	Active Citizen Forum
29.	Rameez Ahmed Memon	IT Secretary	Active Citizen Forum
30.	Syed Tanveer Shah	General Secretary	Active Citizen Forum
31.	Aamir Ali Halo	Manager	Active Citizen Forum
32.	Wasif Qureshi	Chairman	Active Citizen Forum
33.	Jameel Ahmed	Vice Chairman	Pakistan Lovers Youth Organization
34.	Wajid Shams	Project Coordinator	Islamic Relief
35.	Kulsoom Memon	Coordinator	Sindh Radiant Organization
36.	Muhammad Iqbal Khawaja	Reporter	Dawn News
37.	Nazakat Shah	Reporter	Abb Takk Tv
38.	Afaque halo	Reporter	News One Tv
39.	Zahida Shah	Social Worker	Sindh Radiant Organization
40.	Shaista Memon	Social Worker	Sindh Radiant Organization
41.	Haleema Soomro	Social Mobilizer	Sindh Radiant Organization
42.	Samina	Social Mobilizer	Sindh Radiant Organization
43.	Zahida Perveen	Social Mobilizer	Sindh Radiant Organization
44.	Saima Khudai	Social Mobilizer	Sindh Radiant Organization
45.	M Yasir Panjwani	Social Worker	Sindh Radiant Organization
46.	Ubedullah Bhutto	Advocate	District Court, Thatta
47.	Muhammad Ali Mir Jat	Social Worker	Sindh Radiant Organization
48.	Ghulam Sarwar Katiar	Social Worker	Sindh Radiant Organization

DISTRICT BADIN				
S. No.	District	Name	Designation	Organization
1.	Badin	Ghulam Mustafa Jamro	Regional Manager	National Rural Support Program
2.	Badin	Razia Ujjan	Project Director	Rahnuma – Family Planning Association of Pakistan
3.	Badin	M. Khan Samoon	President	Badin Development and Research Prganization
4.	Badin	G. Rasool Memon	Assistant	District Disaster Management Authority
5.	Badin	Prof. Abdullah Mallah	Ex. Principal, Islamia College	Social Worker
6.	Badin	Tufail Ahmed Chandio	Assistant Professor	Sindh University, Lar Campus, Badin
DISTRICT DADU				
S. No.	District	Name	Designation	Organization
1.	Dadu	Abdul Fateh Dahri	Social Worker	-
2.	Dadu	M Aslam Lakher	President	Goth Sudhar Sangat Aghamani
3.	Dadu	Dr. Azam Chandio	Health Officer	Peoples Primary Health Care Initiative
4.	Dadu	Ghulan Bhand	Senior Analyst	Dadu Press Club
5.	Dadu	Ghulam Shabir Kalhoro	Social Welfare	D.O.S.W
6.	Dadu	Khadim Hussain	Coordinator	Women Empowerment & Development Organization
DISTRICT THARPARKAR				
S. No.	District	Name	Designation	Organization
1.	Tharparkar	Mumtaz Nohrio	Journalist	Awaz TV News
2.	Tharparkar	Hajiani Lanjo	Program Manager	Thar Welfare Organization
3.	Tharparkar	Bharoomal Amrani	Project Coordinator	Society for Conservation and Project of Environment
4.	Tharparkar	Muhammad Khan Marri	Manager Programs	Baanhn Beli
DISTRICT THATTA				
S. No.	District	Name	Designation	Organization
1.	Thatta	Ghulam Hussain Khawaja	President	Sindh Radiant Organization
2.	Thatta	Kalsoom Meher	Sociologist	Sindh Radiant Organization
3.	Thatta	Aasim Soomro	LSU Head	Reform Support Unit, Government of Sindh
4.	Thatta	Ghulam Rasool Khatri	Coordinator	WWF-Pakistan
5.	Thatta	Muhammad Iqbal Khawaja	Senior Analyst	DAWN News
6.	Thatta	Nazakat Shah	Analyst	Abb Takk TV
7.	Thatta	Afaque Halo		News One TV

# A-5 | District Profiles

## DISTRICT BADIN

District Badin is located in the southern part of Sindh and lies between north latitude 24°13' to 25°12' and east longitude 68°21' to 69°20'. Badin is bordered by Hyderabad in the north, Mirpurkhas in the east, Tharparkar to the south and Thatta to the west. The Rann of Kuch, which forms the international boundary with India, is about 53 km (33 miles) from the district headquarters at Badin city.

The district is spread over an area of 6,726 sq. km, with an estimated population in 2010 of 1.54 million. It comprises five talukas: Badin, Tando Bago, Golarchi, Talhar and Matli. The name of the district is derived from the district headquarter, taluka Badin, which is also the largest taluka in terms of area.

### Climate Profile

The climate of the district as a whole is moderate, and is influenced by the sea breeze which blows for eight months of the year from March to October, making the hot weather somewhat cooler than for other parts of Pakistan. The climate in summer is generally moist and humid. The winter in Badin is not well marked; it starts from the beginning of November when a sudden change from the moist sea breeze to the dry and cold north-east wind brings about, as a natural consequence, an immediate fall in temperature. Most of the rainfall occurs during the monsoon period, whereas during the rest of the year there is very little rainfall. The district Badin is frequently hit by cyclones and floods because of the proximity to the sea (Figure A.1).

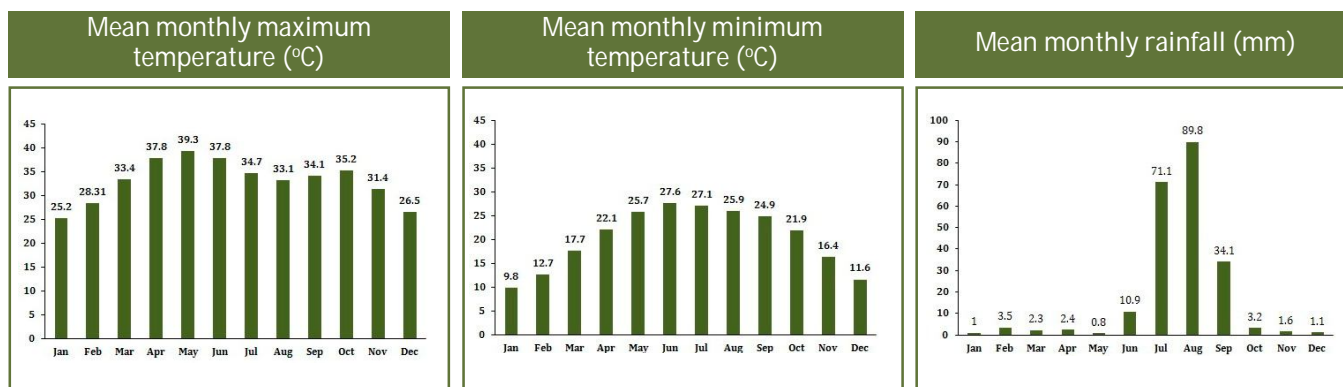


Figure A.1: Mean temperatures and rainfall in Badin

### Box A.1: Climate data sources

The climate data for the parameters of temperature (maximum and minimum) and rainfall for the districts under study, acquired from the Pakistan Meteorological Department (PMD), have been analyzed for determining the past climate trends:

- Badin and Thatta: 1981-2012
- Dadu: 1981-2007 (from the nearby weather station, Padidan)  
2008-2012 (from weather station at Dadu)
- Tharparkar: 1981-2007 (from the nearby weather station, Chhor)  
2008-2012 (from weather station at Mithi)

## Past Climate Trends

Trend analysis using the simple regression technique has been done and changes in precipitation, mean minimum, and mean maximum temperatures have been worked out on annual basis using past thirty one year's (1981-2012) data.

The mean maximum temperature in Badin during the past 31 years shows an increasing trend. The rate of increase remained 0.029 °C per year. The mean maximum temperature, the mean minimum temperature showed an increasing trend during the past 3 decades, with the rate of increase of 0.028 °C. There was a decreasing trend of rainfall during the past 31 years with the rate of increase of 1.219 mm/ year (Figure A.2)

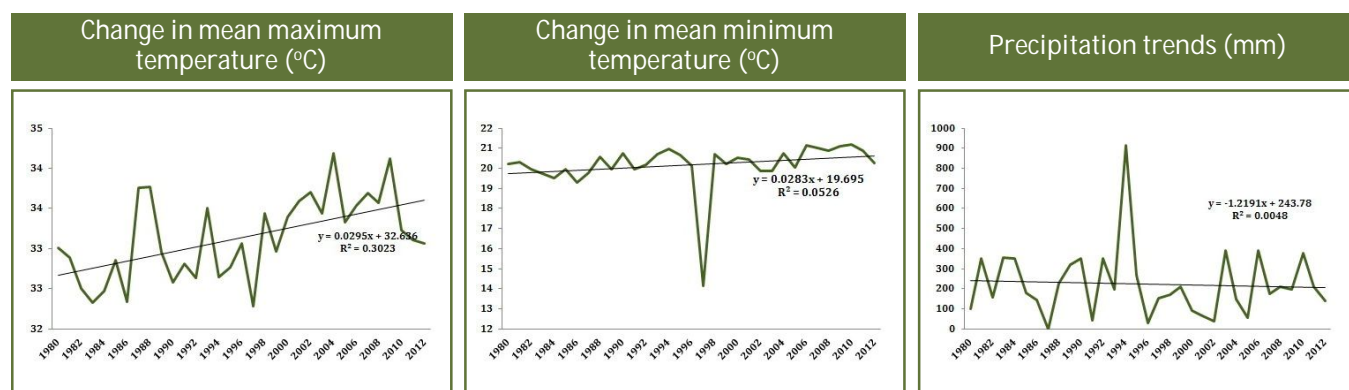


Figure A.2: Trends in mean temperatures and rainfall in Badin

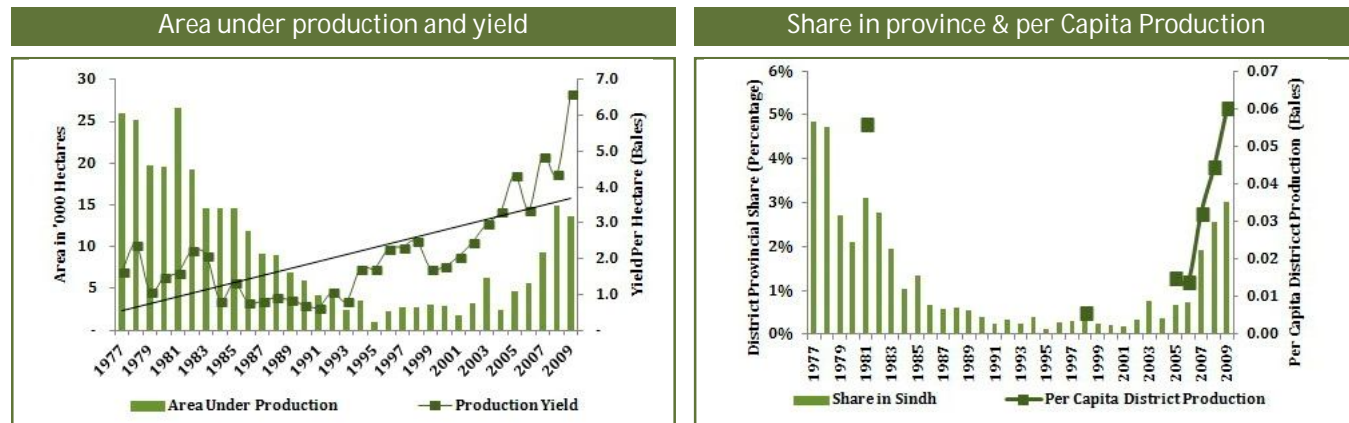


Figure A.3: Cotton Production in Badin

## Agriculture

Agriculture is the main source of income in the district, with all major cash crops (cotton, rice, wheat and sugarcane) grown in it.

### Cotton

The area under cotton crop production in the district has decreased considerably from over 25,000 hectares in 1977 to below 15,000 hectares in 2009. This decline has led to a decline in the district share of provincial production, from almost 5% in 1977 to about 3% in 2009. However,



productivity per hectare has improved from around 6 bales in 1977 to nearly approaching 30 bales in 2009. This has allowed the district to keep per capita district production to at least the level of 1981, i.e. 0.06 bales (recorded in 2009).

### Rice

Badin remains a major contributor of rice crop in Sindh, but its share has fallen considerably from almost 17% in 1977 to almost 10% in 2009. Per capita district production has also decreased from 300 kg in 1981 to almost 200 kg in 2009. The reduction in district share is largely attributed to reduction in area under rice crop production, from 120,000 hectares in 1977 to about 80,000 hectares in 2009. However, as with cotton, yield per hectare has improved over the years to about 3.5 MT per hectare in 2009 (1976: 2.0 MT per hectare);

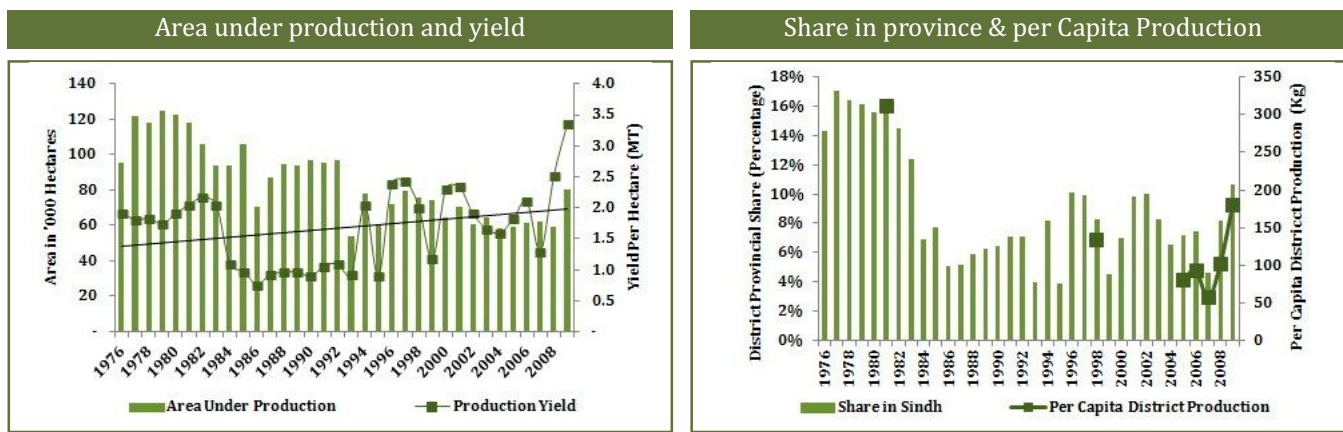


Figure A.4: Rice Production in Badin

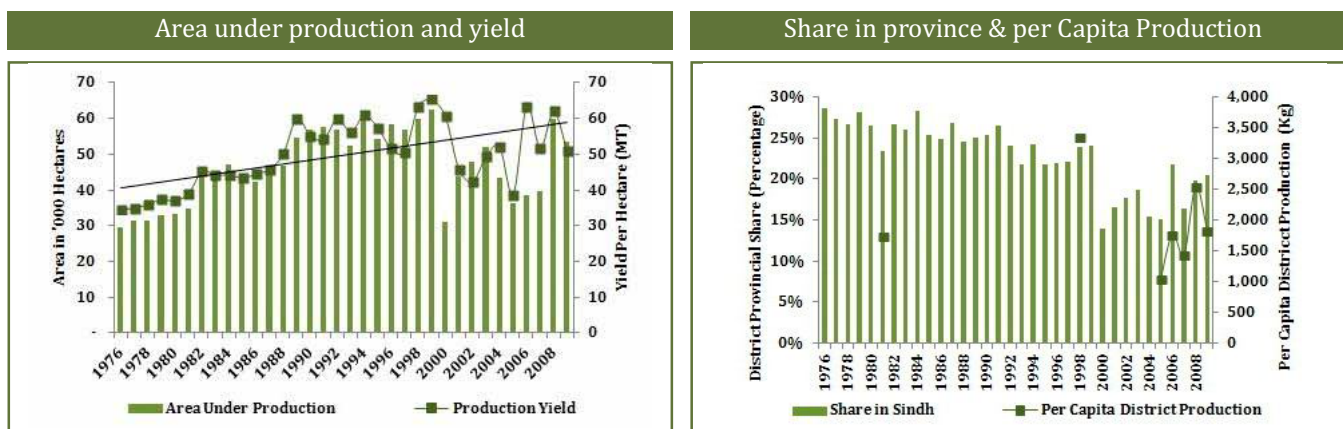
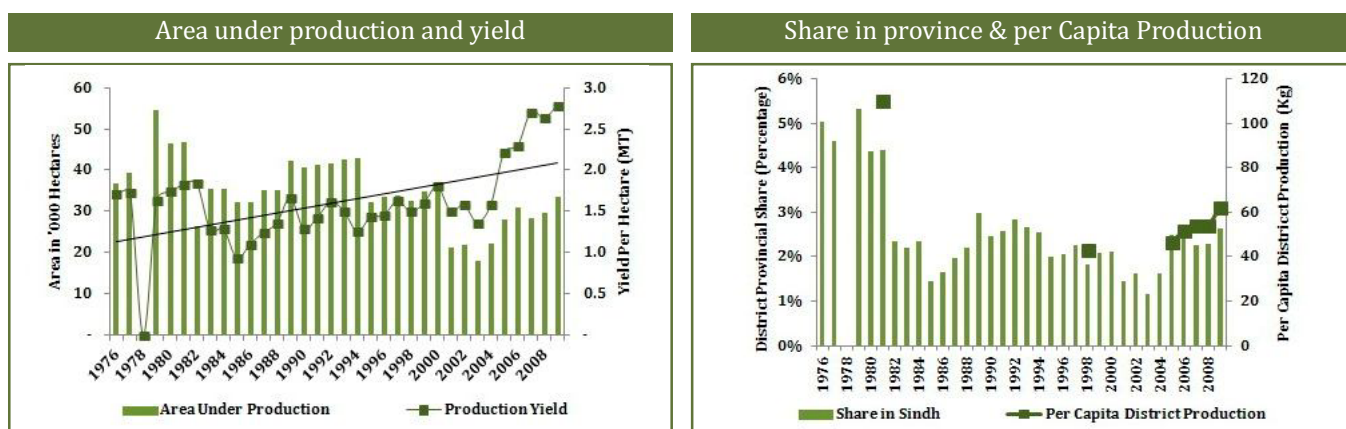


Figure A.5: Sugarcane Production in Badin

### Sugarcane

District Badin is the largest contributor of sugarcane in Sindh, accounting for almost 20% of provincial production; however this is down from the almost 28% share in 1976. The area under sugarcane production has risen from 30,000 hectares in 1976 to about 60,000 hectares in 2008. Data of yield per hectare reveals high variation during the period 1976-2009, with a maximum yield of about 65 MT in 1999 (2009: 50 MT).



**Figure A.6:** Wheat Production in Badin

### Wheat

The area under wheat production in Badin has varied significantly during the period 1976-2009; overall, however, the data shows a declining trend from a peak of almost 55,000 hectares in 1979 to around 30,000 hectares during the period 2006-2009. The district's share of provincial production has also fallen from over 5% in 1979 to less than 3% in 2009. Yield per hectare of wheat crop has considerably improved, from 1.6 MT per hectare in 1976 to about 2.8 MT per hectare in 2009.

### Other Social Indicators

Badin fares poorly in terms of human development indicators, as seen in Annex Tables A.1 and A.2.

**Table A.1** Indices of multiple deprivations and poverty - Badin

Overall Indices of Multiple Deprivations	
Index Value	43.91
National Rank (1 = Least; 113 = Most)	88
Provincial Rank (1 = Least; 23 = Most)	21
Sectoral Indices of Multiple Deprivations	
Education	56.61
Health	21.88
Housing Quality	47.61
Housing Services	34.61
Economic	79.78
Multi-Dimensional Poverty Indices (2011)	
Incidence	80.3
Gap	27.79
Severity	12.91

Sources:

1. Haroon Jamal, "Districts' Indices for Multiple Deprivation for Pakistan, 2011", SPDC Research Report No. 82 (2012).
2. Haroon Jamal, "An Exploratory Analysis of Inter-Temporal Multidimensional Poverty", SPDC Research Report No. 83 (2012).

**Table A.2:** Multiple Deprivations – Selected Indicators for Badin

Indicator	1981 <sup>a</sup>	1998 <sup>a</sup>	2004-05	2006-07	2008-09	2010-11	2012-13
<b>Illiteracy Rate<sup>b</sup></b>							
Overall	85	76	58	65	60	61	64
Male	78	65	45	52	45	46	50
Female	92	88	73	80	78	78	79
No Immunization <sup>c</sup>	-	56	17	29	1	0	0
Congested Household (Single Room)	79	82	49	46	44	40	51
Household without Toilet	32	57	30	30	20	20	32
Unsafe Drinking Water (other than tap water)	94	83	79	83	84	82	86
Using Inadequate Fuel for Cooking (Wood, Charcoal, Kerosene etc.)	99	97	88	97	90	92	91

Source:

Pakistan Social and Living Standards Measurement (various Issues)

<sup>a</sup> District Census Report (1981,1998)

<sup>b</sup> Age 10 years and above

<sup>c</sup> Children Aged 12-23 months, at least one immunization

## DISTRICT DADU

District Dadu is located in the south-western part of the province of Sindh forming an interprovincial boundary with Balochistan province on the south west. The rest of the three sides of the district boundaries are intra-provincial connections with Larkana, Nausheroferoz and Jamshoro districts on north, east and south, respectively. The district lies between 24°57' to 27°27' north latitudes and 67°09' to 68°25' east longitudes.

The district is spread over an area of 7,866 Sq. Km with an estimated population of 1.54 million in 2010. The district comprises of 4 talukas namely Dadu, Johi, Mehar and Khairpur Nathan Shah (K N Shah). The name of the district is derived from the district headquarter Taluka Dadu. Johi is the largest taluka of the district by area, followed by KN Shah. In terms of population the district headquarter has the largest share with almost 30% of the total district population.

### Climate Profile

The climate of the district is intensively hot in summer and cold enough in winter (Figure A.7). One peculiar feature of climate is sub zero temperature in Gorakh Hill Range during winter, whereas in June, July the mercury remains below 20 °C. July and August are the months receiving the highest rainfall while rest of the year receives nominal rainfall. The average annual rainfall in the district is about 120 millimeters.

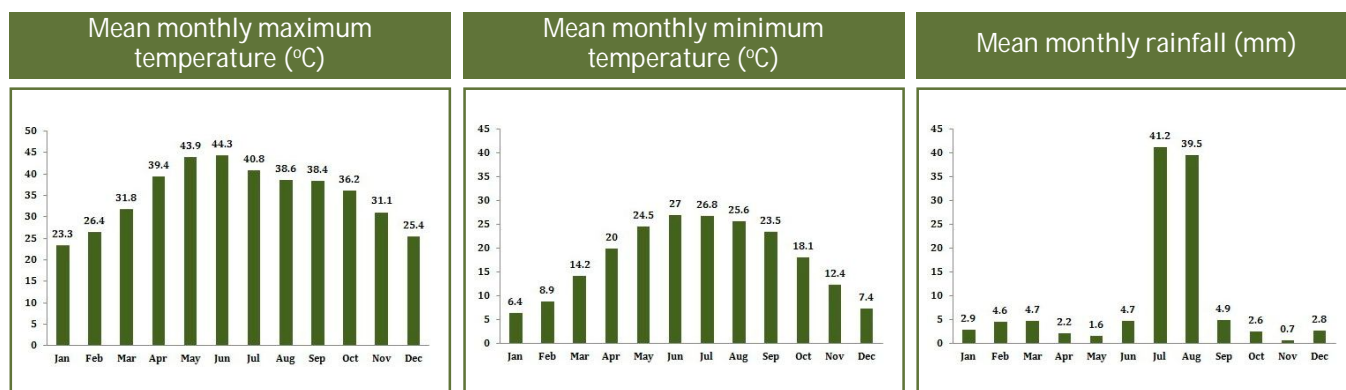
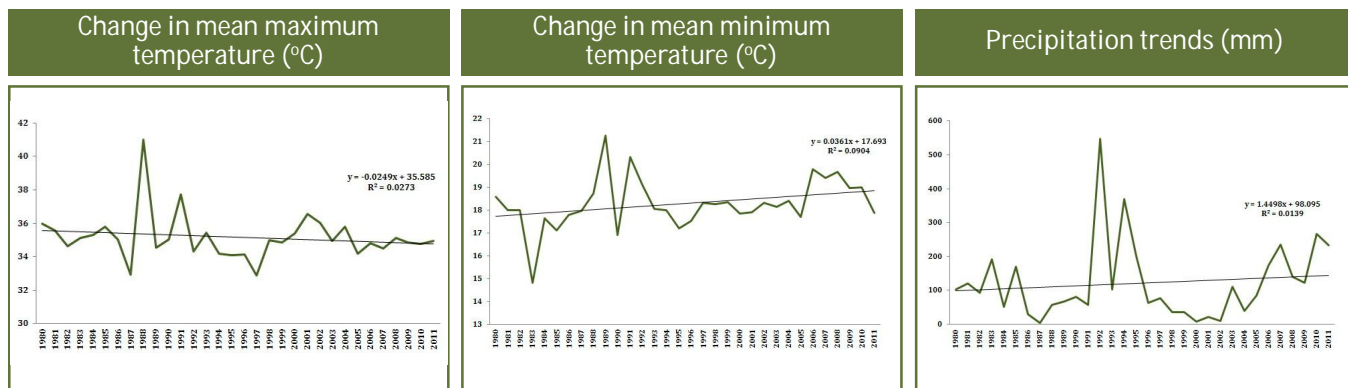


Figure A.7: Mean temperatures and rainfall in Dadu

### Past Climate Trends

Trend analysis using the simple regression technique has been done and changes in precipitation, mean minimum, and mean maximum temperatures have been worked out on annual basis using past thirty one year's (1981-2012) data.

The mean maximum temperature in Dadu decreased over the past 31 years at the rate of 0.024 °C per year. This was the only decrease in maximum temperature observed in any of the four districts under study. The mean minimum temperature increased during the study period at the rate of 0.036 °C per year. The increase was highest among the four districts under study. The rainfall showed an increasing trend during the past thirty one years; the increase being 1.449 mm/ year (Figure A.8).



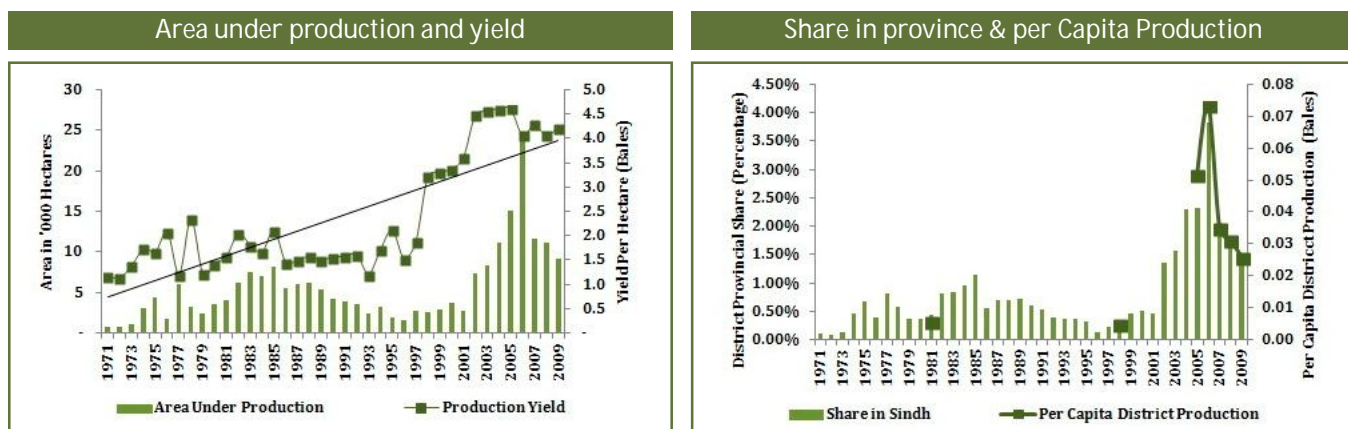
**Figure A.8:** Trends in mean temperatures and rainfall in Dadu

## Agriculture

Agriculture is the main source of income in the district, with all major cash crops (cotton, rice, wheat and sugarcane) grown in it.

### Cotton

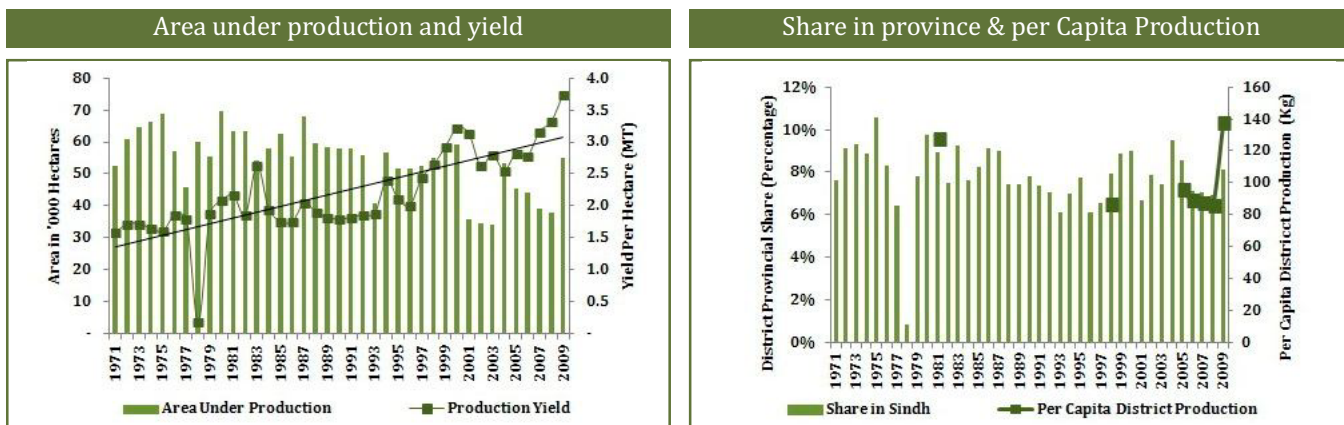
The provincial share of the crop in the province has increased from 0.1% in 1977 to 3.82% in 2006, however, reduced 1.3% in 2009 due to reduction in area under cultivation for cotton. Productivity per hectare has improved from around 1.16 bales in 1977 to 4.22 bales in 2009. This has allowed the district to keep per capita district production to improve to 0.025 bales in 2009.



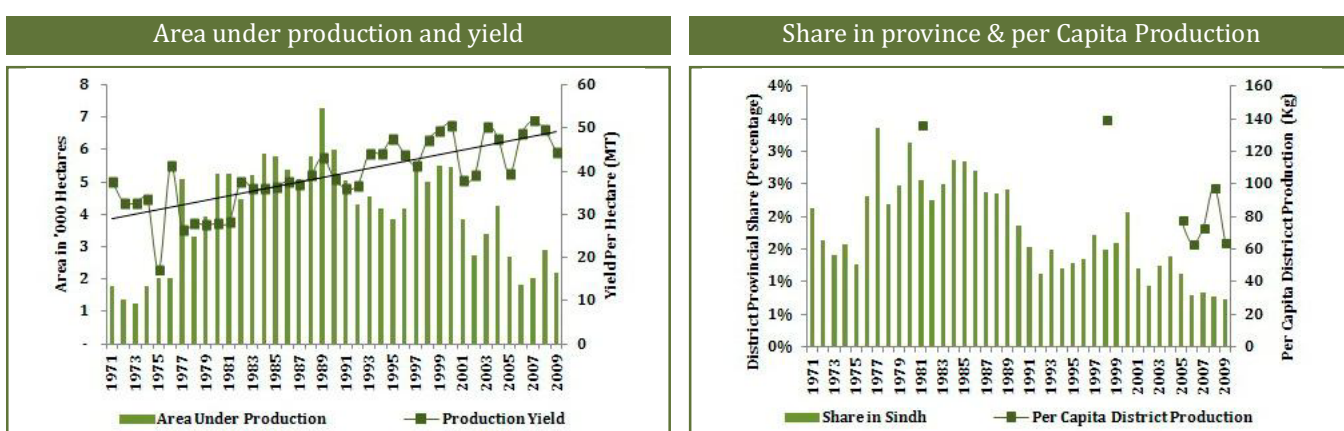
**Figure A.9:** Cotton Production in Dadu

### Rice

Dadu is contributing a major share in total production of rice in the Sindh province, however, the share has fallen from 11% in 1975 to 10% in 2004 and further to 8% in 2009. Yield per hectare has improved from 1.60 MT per hectare to 3.75 MT per hectare. This has allowed the district to keep per capita district production to at least the level of 1981, i.e. 135 kg (recorded in 2009).



**Figure A.10: Rice Production in Dadu**



**Figure A.11: Sugarcane Production in Dadu**

### Sugarcane

Water scarcity in the district Dadu led to decline in cultivation area by more than half of the total cultivation area in 1989 i.e. 729,000 hectares in 1989 to 289,000 hectares in 2008. Yield per hectare however improved from 37.69 MT per hectare in 1971 to 43.26 MT per hectare in 1989 and further to 51.70 MT per hectare in 2006. Share in the Sindh province reduced from over 2% in 1971 to below 1% during the period 2006 to 2009.

### Wheat

The area under wheat production in Dadu has varied significantly during the period 1971-2009; overall, however, the data shows a declining trend from a peak of almost 70,000 hectares in 1971 to around 55,000 hectares during the period 2001-2009. Yield per hectare of wheat crop has considerably improved, from 1.13 MT per hectare in 1971 to about 2.9 MT per hectare in 2009. This has allowed keeping the district's Share in provincial production to at least 5% during the period 1971-2009.



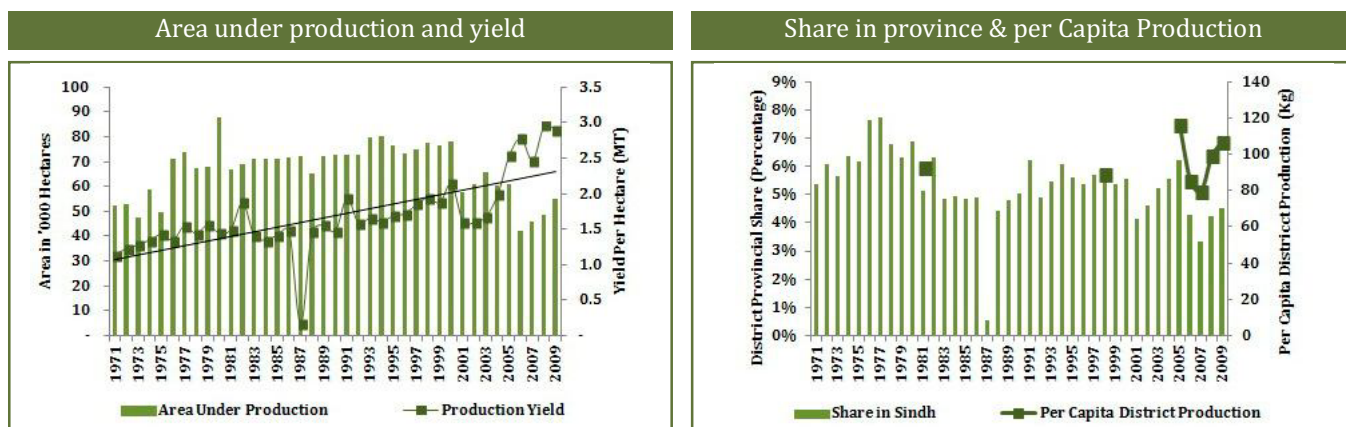


Figure A.12: Wheat Production in Dadu

## Other Social Indicators

Dadu fares poorly in terms of human development indicators, as seen in Annex Tables A.3 and A.4.

**Table A.3** Indices of multiple deprivations and poverty - Dadu

Overall Indices of Multiple Deprivations	
Index Value	25.67
National Rank (1 = Least; 113 = Most)	38
Provincial Rank (1 = Least; 23 = Most)	8
Sectoral Indices of Multiple Deprivations	
Education	29.1
Health	21.52
Housing Quality	18.63
Housing Services	17.64
Economic	54.15
Multi-Dimensional Poverty Indices (2011)	
Incidence	53.59
Gap	11.06
Severity	3.61

Sources:

1. Haroon Jamal, "Districts' Indices for Multiple Deprivation for Pakistan, 2011", SPDC Research Report No. 82 (2012).
2. Haroon Jamal, "An Exploratory Analysis of Inter-Temporal Multidimensional Poverty", SPDC Research Report No. 83 (2012).

**Table A.4:** Multiple Deprivations – Selected Indicators for Dadu

Indicator	1981 <sup>a</sup>	1998 <sup>a</sup>	2004-05	2006-07	2008-09	2010-11	2012-13
<b>Illiteracy Rate<sup>b</sup></b>							
Overall	79	65	53	69	39	35	38
Male	68	52	46	45	21	21	21
Female	91	78	72	74	60	51	58
No Immunization <sup>c</sup>	-	44	14	14	4	2	5
Congested Household (Single Room)	78	73	52	45	25	35	45
Household without Toilet	25	33	6	26	5	1	10
Unsafe Drinking Water (other than tap water)	87	76	57	59	77	87	92
Using Inadequate Fuel for Cooking (Wood, Charcoal, Kerosene etc.)	97	90	89	84	75	73	77

Source:

Pakistan Social and Living Standards Measurement (various Issues)

<sup>a</sup> District Census Report (1981,1998)

<sup>b</sup> Age 10 years and above

<sup>c</sup> Children Aged 12-23 months, at least one immunization

## DISTRICT THARPARKAR

District Tharparkar, earlier known as 'Thar' and 'Parkar' district, is located between 24°10' to 25°45' north latitudes and 69°04' to 71°06' east longitudes. Until 1990, district Umer Kot and district Mirpurkhas were also the part of district Tharparkar. Previously Mirpurkhas was the headquarter but after establishment of new districts, Mithi become the new headquarter of the district Tharparkar.

Tharparkar spreads over an area of 19,638 Sq. Km with estimated population of about 1.3 million. The district comprise of four (04) talukas namely Chachro, Nagarparkar, Mithi and Diplo. Chachro is the largest district by area and population, followed by district headquarter Mithi.

### Climate Profile

The district has a tropical desert climate. In summer, it is extremely hot during the day, but nights are remarkably cooler. April, May and June are the hottest months during the day and the temperature often exceeds 50 °C. December, January and February are the coolest months and the temperature gets as low as 5 °C. There are wide fluctuations in the amount of rainfall from year to year; the yearly average for some areas is as low as 100 mm. Most of the rainfall occurs between July and September, during the south-west monsoon, and is often concentrated in a period of two to three days. Dust storms are also frequent in the area in May and June (Figure A.13).

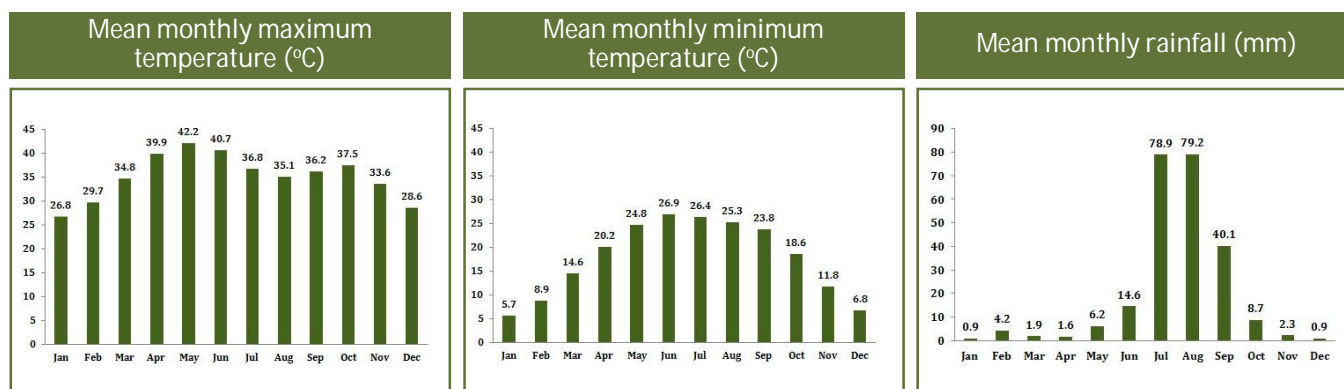


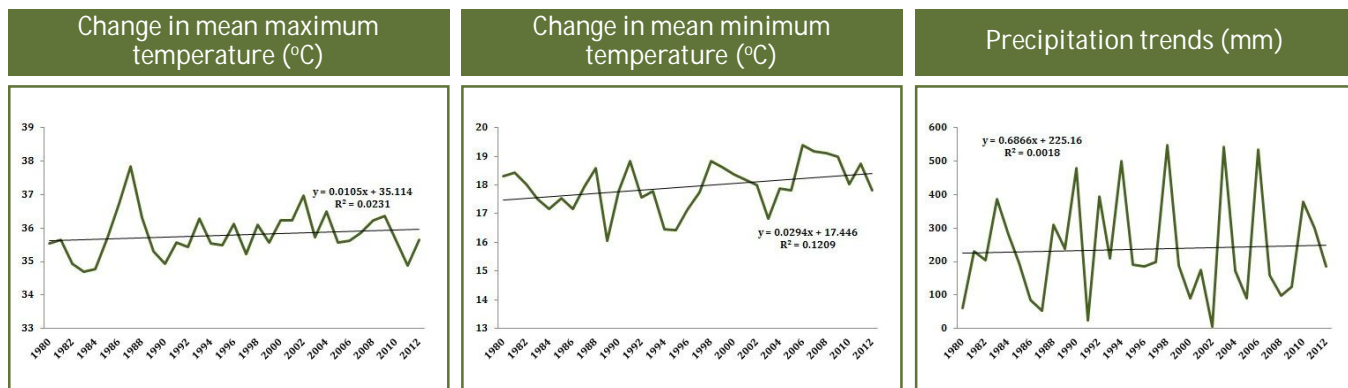
Figure A.13: Mean temperatures and rainfall in Tharparkar

### Past Climate Trends

Trend analysis using the simple regression technique has been done and changes in precipitation, mean minimum, and mean maximum temperatures have been worked out on annual basis using past thirty one year's (1981-2012) data.

The mean maximum temperature in Tharparkar showed a slightly increasing trend during the past three decades. The rate of change was 0.010 °C per year. The mean minimum temperature increased at the rate of 0.029°C per year during the past 31 years. The analysis showed that rainfall in the district has increased over the past thirty years, at the rate of 0.686 mm/ year (Figure A.14).





**Figure A.14:** Trends in mean temperatures and rainfall in Tharparkar

## Agriculture

The district has very meager share in provincial major crop production as only 30% of the land of the district is cultivable, while the rest 70% is comprises of sand dunes. There are few crops cultivated in the district, which largely depends on rains. In the events of no rain, which is normal in desert areas, the lands are found to be barren. In such cases, the district is faced with drought conditions. Thus, agriculture practice is on very small scale in the district which is also largely affected due to drought situation in some years during the period 1992-2009. There is no possibility of flood as neither “River Indus” touches, nor any big canal passes through the district.

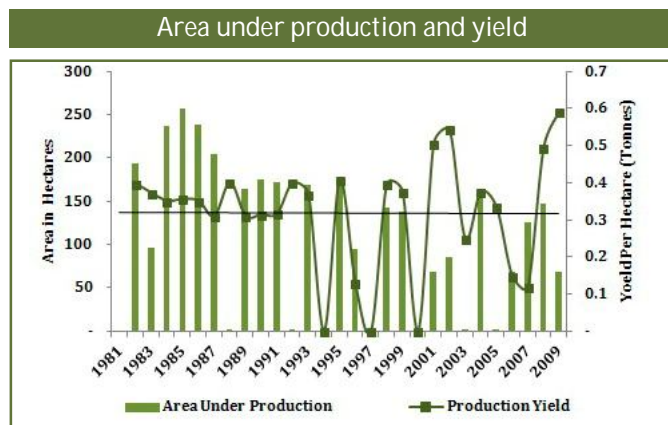
Largely minor crops including Bajra (millet), Guar seed, Mungbean and Mash is cultivated in the district.

### Bajra (Millet)

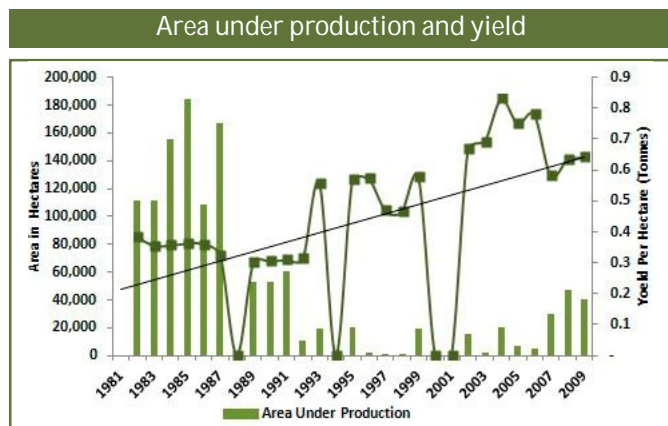
Bajra is a crop that has replaced wheat in Tharparkar district mainly because of water scarcity. A slight increasing trend in yield of Bajra is observed; the rate of increase is 0.0006 tonnes per hectare per year.

### Guar (Cluster Bean)

The area under Guar in the district has increased overtime in replacement to major crops like wheat. The analysis shows an increasing trend in the yield of guar at the rate of 0.019 tonnes per hectare per year. However, the area under cultivation has been sharply declined during the past two decades from over 150,000 hectares during 1984-87 to below 50,000 hectares due to erratic rainfall pattern in the district.



**Figure A.15:** Bajra (Millet) Production in Tharparkar



**Figure A.16:** Guar Production in Tharparkar

Area under production and yield

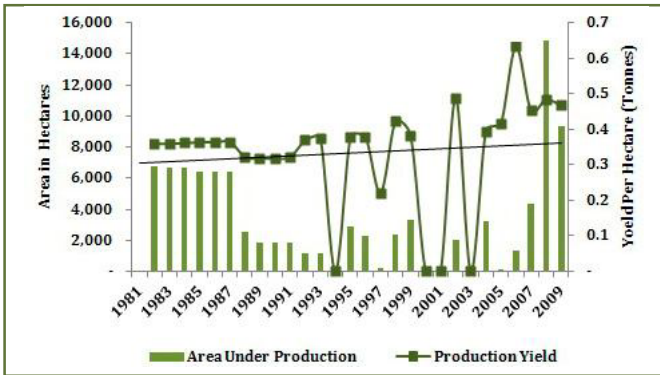


Figure A.17: Mungbean Production in Tharparkar

Area under production and yield

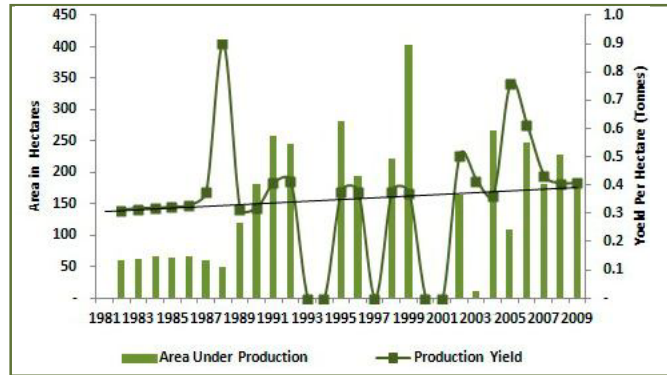


Figure A.18: Mash Production in Tharparkar

**Mungbean (Lentil)**

Mungbean yield in the district increased overtime with an increase rate of 0.0067 tonnes per hectare per annum.

**Mash (Pulse)**

A slight increase in Mash pulse yield is observed in the past 28 years; the rate of increase being 0.006.

**Other Social Indicators**

District Tharparkar fares poorly in terms of human development indicators, as seen in Annex Tables A.5 and A.6.

**Table A.5** Indices of multiple deprivations and poverty - Tharparkar

Overall Indices of Multiple Deprivations	
Index Value	54.5
National Rank (1 = Least; 113 = Most)	103
Provincial Rank (1 = Least; 23 = Most)	23
Sectoral Indices of Multiple Deprivations	
Education	47.3
Health	34.8
Housing Quality	52.2
Housing Services	62.3
Economic	89.9
Multi-Dimensional Poverty Indices (2011)	
Incidence	93.3
Gap	39.3
Severity	20.8

Sources:

1. Haroon Jamal, "Districts' Indices for Multiple Deprivation for Pakistan, 2011", SPDC Research Report No. 82 (2012).
2. Haroon Jamal, "An Exploratory Analysis of Inter-Temporal Multidimensional Poverty", SPDC Research Report No. 83 (2012).

**Table A.6:** Multiple Deprivations – Selected Indicators for Dadu

Indicator	1981 <sup>a</sup>	1998 <sup>a</sup>	2004-05	2006-07	2008-09	2010-11	2012-13
<b>Illiteracy Rate<sup>b</sup></b>							
Overall	84	82	64	71	79	54	61
Male	76	72	49	56	61	35	46
Female	92	93	82	88	82	75	79
<b>No Immunization<sup>c</sup></b>							
Congested Household (Single Room)	45	25	12	15	14	22	17
Household without Toilet	30	78	67	58	43	42	47
Unsafe Drinking Water (other than tap water)	89	98	76	91	95	87	93
Using Inadequate Fuel for Cooking (Wood, Charcoal, Kerosene etc.)	99	99	99	98	100	99	99

Source:

Pakistan Social and Living Standards Measurement (various Issues)

<sup>a</sup> District Census Report (1981,1998)

<sup>b</sup> Age 10 years and above

<sup>c</sup> Children Aged 12-23 months, at least one immunization

## DISTRICT THATTA

District Thatta is situated at the very south of Pakistan, Sindh province about 60 miles from Karachi it is situated from 23°43' to 25°26' north latitudes and 67°05' to 68°45' east longitudes. Thatta city is the headquarter of the district and the district is bounded on the north by Jamshoro district, on the east by Hyderabad, Tando Mohammad Khan and Badin districts and India, on the south by Rann of Kutch<sup>1</sup> area and the Arabian Sea and on the west by Karachi division. River Indus flows on the east side of the district (from Hyderabad and Badin).

The total area of the district is 17,355 square kilometers with estimated population of 1.6 million in 2011 (population density stands at 94<sup>2</sup>). The district is divided into 9 Talukas namely Thatta, Ghorabari, Jati, Ketu Bunder, Kharo Chan, Mirpur Bathoro, Mirpur Sakro, Shah Bunder and Sujawal. Taluka Thatta has the district headquarter Thatta city and is also the largest taluka in terms of area (3823 sq kms) and houses the largest share of population (23%).

### Climate Profile

The climate of the district taken as a whole is moderate, and is influenced by the sea breeze which blows for eight months of the year from March to October, making the hot weather somewhat cooler than for other parts of Pakistan. The climate in summer is generally moist and humid. Climatic data of the district is not available due to absence of Meteorological office in the district. However, with similar profile of Badin district, the climatic data of the district is used as proxy data for the district Thatta.<sup>3</sup>

### Agriculture

Agriculture is the main source of income in the district, with all major cash crops (cotton, rice, wheat and sugarcane) grown in it.

#### Cotton

The provincial share of the crop in the province has remained under 0.20 during the period 1976-2009. This is mainly due to low area under production for cotton in the district which stood below 2000 hectares during the period.

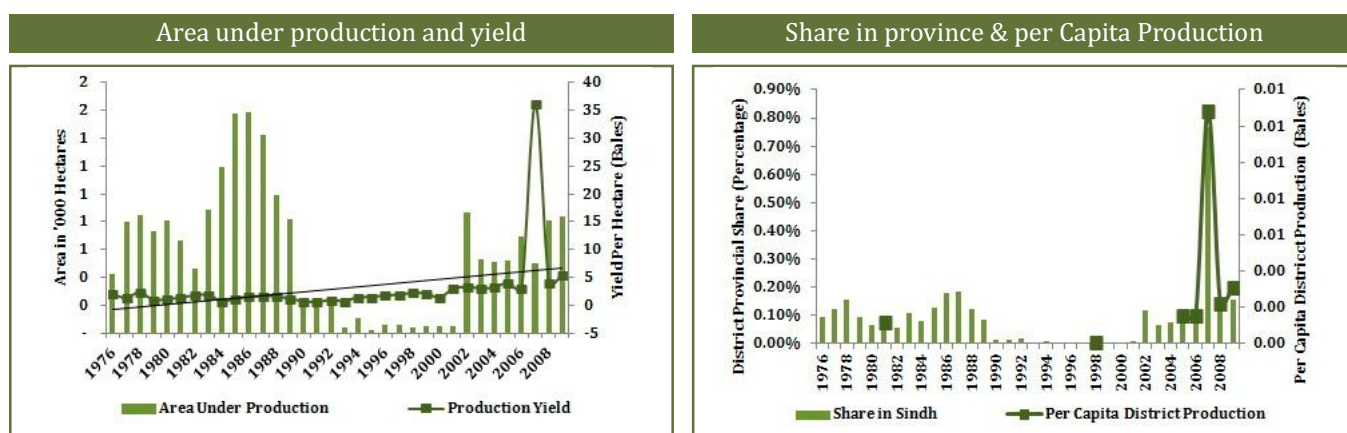


Figure A.19: Cotton Production in Thatta

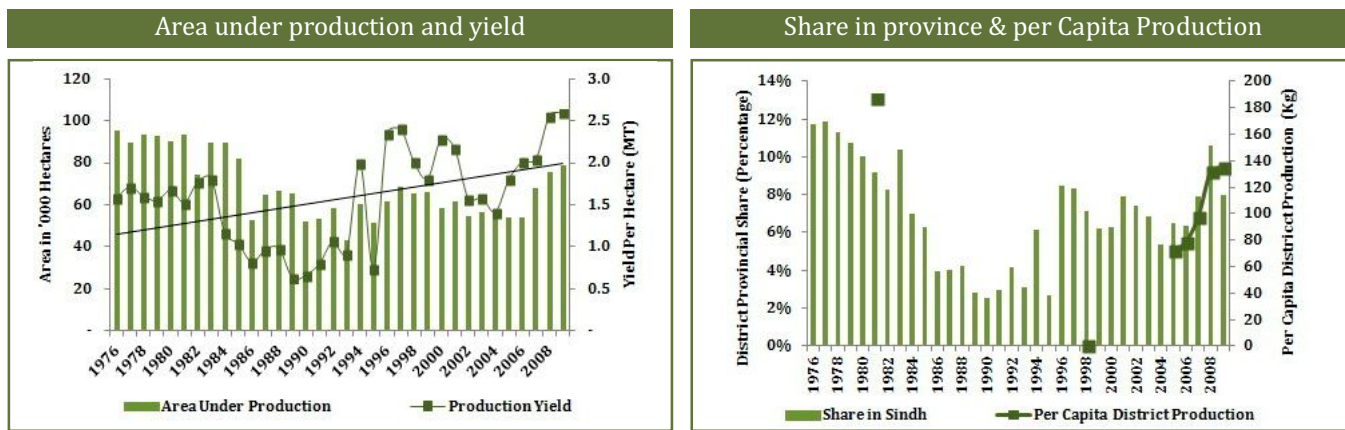


Figure A.20: Rice Production in Thatta

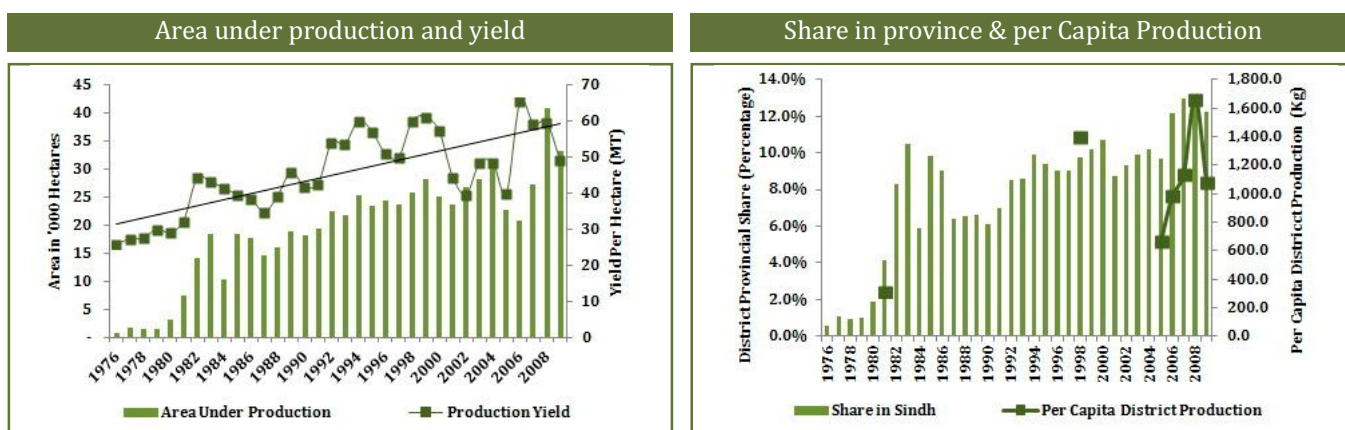


Figure A.21: Sugarcane Production in Thatta

### Rice

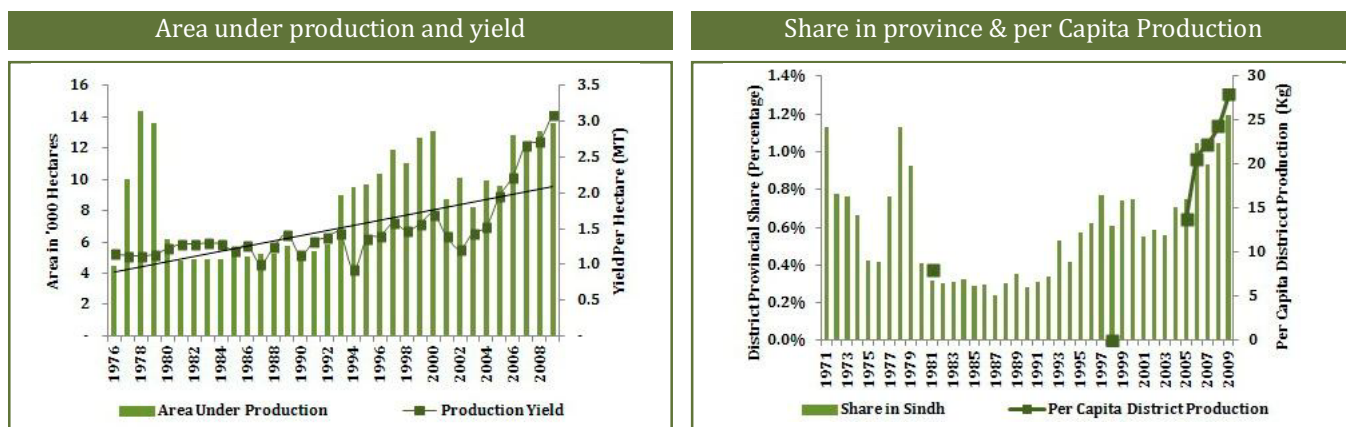
Thatta is one of the major contributors in rice crop to province of Sindh, with its share almost 11% in 2009 and has remained unchanged since 1977. Yield per hectare has improved from 1.5 MT per hectare to 2.5 MT per hectare. This has allowed the district to improve per capita district production to at least the level of 1982, i.e. over 140 kg (recorded in 2008).

### Sugarcane

District Thatta is one of the major contributors of sugarcane in province of Sindh; almost 12% of the production comes from district Thatta, and it is being increased from its level of under one percent in 1976. This is mainly because of the increased under production by 30(x) from 1,000 hectares in 1976 to 30,000 hectares recorded in 2008. Yield per hectare however also improved from 25 MT per hectare in 1976 to 64 MT per hectare in 2006.

### Wheat

The area under wheat production in Thatta has varied significantly during the period 1971-2009; overall, however, the data shows an increasing trend from average of 5,000 hectares during 1980-1992 to around 12,000 hectares in 2009. Yield per hectare of wheat crop has considerably



**Figure A.22:** Wheat Production in Thatta

improved, from 1.3 MT per hectare in 1976 to about 3.0 MT per hectare in 2008. This has allowed increase in per capita production to 28 kg in 2009 from 8 kg recorded in 1976.

### Other Social Indicators

Thatta fares poorly in terms of human development indicators, as seen in Annex Tables A.7, and A.8.

**Table A.7** Indices of multiple deprivations and poverty - Thatta

Overall Indices of Multiple Deprivations	
Index Value	52.10
National Rank (1 = Least; 113 = Most)	102
Provincial Rank (1 = Least; 23 = Most)	22
Sectoral Indices of Multiple Deprivations	
Education	63.07
Health	31.62
Housing Quality	54.01
Housing Services	42.81
Economic	83.22
Multi-Dimensional Poverty Indices (2011)	
Incidence	82.02
Gap	31.59
Severity	15.86

Sources:

1. Haroon Jamal, "Districts' Indices for Multiple Deprivation for Pakistan, 2011", SPDC Research Report No. 82 (2012).
2. Haroon Jamal, "An Exploratory Analysis of Inter-Temporal Multidimensional Poverty", SPDC Research Report No. 83 (2012).

**Table A.8:** Multiple Deprivations – Selected Indicators for Thatta

Indicator	1981 <sup>a</sup>	1998 <sup>a</sup>	2004-05	2006-07	2008-09	2010-11	2012-13
<b>Illiteracy Rate<sup>b</sup></b>							
Overall	82	78	65	66	59	64	64
Male	74	68	52	52	44	50	52
Female	92	89	83	84	78	81	77
<b>No Immunization<sup>c</sup></b>	-	46	29	18	2	3	21
<b>Congested Household (Single Room)</b>	77	78	33	39	37	36	55
<b>Household without Toilet</b>	35	48	36	18	56	38	24
<b>Unsafe Drinking Water (other than tap water)</b>	89	80	73	77	77	82	84
<b>Using Inadequate Fuel for Cooking (Wood, Charcoal, Kerosene etc.)</b>	99	97	91	95	78	86	86

Source:

Pakistan Social and Living Standards Measurement (various Issues)

<sup>a</sup> District Census Report (1981,1998)

<sup>b</sup> Age 10 years and above

<sup>c</sup> Children Aged 12-23 months, at least one immunization

### NOTES:

1. It is a seasonal salt marsh located in the Thar Desert in the Kutch District of Gujarat, India and the Sindh province of Pakistan.
2. Person per square kilometer.
3. District Census Report of Thatta, 1998, Population Census Organization, Statistics Division, Government of Pakistan, (Census Publication No. 54, December 1999).



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## Acronyms

BHU	Basic Health Unit
BISP	Benazir Income Support Programme
CBOs	Community Based Organizations
DC	Deputy Commissioner
DDMAs	District Disaster Management Authorities
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
ERC	Emergency Relief Cell
FFC	Federal Flood Commission
FGDs	Focus Group Discussions
FHHs	Female Headed Households
GCC	Gender and Child Cell
GCMs	General Circulation Models
HFA	Hyogo Framework for Action
HH	Household
IDRC	International Development Research Centre
INGO	International Non-governmental Organization
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KII	Key Informants' Interviews
LBOD	Left Bank Outfall Drain
LHWs	Lead Health Workers
MHHs	Male Headed Households
MNVD	Main Nara Valley Drain
MOC	Memorandum of Cooperation
NDMA	National Disaster Management Authority
NDRMF	National Disaster Risk Management Framework
NDRP	National Disaster Response Plan
NGOs	Non-Governmental Organisations
NRSP	National Rural Support Programme
NWFP	North-West Frontier Province
PAR	Pressure and Release

PCO	Population Census Organization
PDM	Pakistan Meteorological Department
PDMA	Provincial Disaster Management Authority
RA	Research Assistant
SLDs	Shared Learning Dialogues
SPDC	Social Policy and Development Centre
SPO	Strengthening Participatory Organizations
T.V	Television
TRDP	Thardeep Rural Development Programme
UN	United Nations
UNDP	United Nations Development Programme
VCI	Vulnerabilities and Capacities Index
WWF	World Wide Fund

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