CLIMATE CHANGE AND WOMEN:

A STUDY IN SELECTED SITES IN RURAL SINDH, PAKISTAN – 2011

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Acronyms

ADO	Aurat Development Organization
BHU	Basic Health Unit
BISP	Benazir Income Support Programme
CBO	Community Based Organization
DAP	Di-Ammonium Phosphate
ETo	Evapotranspiration
FGD	Focus Group Discussion
FM	Frequency Modulation
GDP	Gross Domestic Product
HA	Hectares
HDI	Human Development Index
HH	Household
IPCC	Inter-Governmental Panel on Climate Change
LBOD	Left Bank Outfall Drain
LHW	Lady Health Worker
MDG	Millennium Development Goals
MHU	Mobile Health Units
MNA	Member of National Assembly
NDMA	Natural Disaster Management Authority
NGO	Non-governmental Organization
PRA	Participatory Rural Appraisal
RHC	Rural Health Centre
SG	Shirkat Gah
TFR	Total Fertility Rate
UC	Union Council
WAPDA	Water and Power Development Authority
WWF-P	World Wildlife Fund-Pakistan

Executive Summary

Our world's climate is rapidly changing and will continue to change. How climate change will impact different areas may be unpredictable, however, the risks associated with these changes and the vulnerability of populations across the globe cannot be ignored. The effect on agriculture, livestock and fisheries threatens livelihoods and food security of rural populations in developing countries. As security is determined by the availability of resources and who can claim those resources, the poor are most vulnerable to the vagaries of climate change. Approximately seventy percent of these are women. Furthermore, the existing social disadvantages women face can increase the magnitude of the negative impacts of climate change and environmental damage.

Pakistan has been identified as one of the top countries most affected by extreme weather events. In recent years there has been an increase in the average mean surface temperature and the average mean annual rainfall in Pakistan. Other environmental factors such as melting glaciers and an increase in sea levels pose potential threats in the future. The recent floods in Pakistan (2010 and 2011) make it clear that the impacts of climate changes can no longer be overlooked. It is also imperative to understand climate change as experienced by women.

Shirkat Gah conducted an action research in four villages of District Shaheed Benazirabad (formerly Nawabshah) with an estimated population of 1800-2000 where roughly half of the total population was engaged. Located on the banks of River Indus in the Sindh plains, this is a flood prone area. While the District ranking in terms of development is above average, the impact of development and climate change has had an adverse impact on the poor further exacerbated by the flood of 2011. Local women have reproductive and productive roles and contribute significantly in the income generation of their families. The study attempts to capture the local community's perceptions, especially those of women, of change over a period of 30-40 years; their observations and opinions on the causes of weather and climate change; and the strategies they have adopted to counter these changes.

Chapter 1

The Context

Climate change is one of the most significant global threats today and its impacts are being felt across the world. Geographically located in a region where temperature increases are expected to be higher than global averages, Pakistan is highly vulnerable to the effects of climate change. As a developing country, Pakistan also lacks the necessary expertise, infrastructure and technology to effectively respond to and recover from the impact of natural disasters. According to a 'climate risk index' compiled by Germanwatch, an independent development and environmental organization, Pakistan topped a list of countries worst affected by extreme weather disasters.[1] About one half of the population of Pakistan is that of women, which according to local environmentalists already suffer disproportionately from the impacts of climate change. It is estimated that of the poor who are far more vulnerable to environmental damage, 70 percent are women.[2]

Changing Weather Patterns: Pakistan has been ranked number one on a list of countries hit worst by weather extremes in 2010.[3] Various climate change reports and analysis of weather data suggest changes in the weather patterns of Pakistan which would result in an increase in natural

[1] Farrukh Zaman, "UN climate summit: Pakistan tops climate-risk index." The Express Tribune on the Web 30 Nov 2011. 13 April 2012 <http://tribune.com.pk/story/299910/un-climate-summit-pakistan-tops-climate-risk-index/>.

[2] Bushra Khaliq, "Pakistani women are worst hit by climate change", IV Online magazine: IV418 – November 2009. Retrieved on 13 April 2012 <http://www.internationalviewpoint.org/spip.php?article1744>.

[3] Sven Harmeling, Briefing Paper "Global Climate Risk Index 2012. Who suffers most from extreme weather events? Weather-Related Loss events in 2010 and 1991 to 2010" p.7, Germanwatch (2011). Retrieved 13 April 2012 from <http://www.germanwatch.org/cri>.

disasters. According to a study by Farooqi, Khan and Mir there has been a consistent rising trend in the annual mean surface temperature of the country since the beginning of the twentieth century. There has been a rise of 0.6-1.0°C in the mean temperature in arid coastal areas, arid mountains and hyper arid plains, a 10-15% decrease in winter and summer rainfall in the coastal belt and hyper arid plains, and an 18-32% increase in rainfall in the monsoon zone, especially the sub-humid and humid areas. A 5% decrease in relative humidity in Balochistan and a 0.5 to 0.7% increase in solar radiation has been seen over the southern half of Pakistan. Farooqi et al. also report a 3-5% decrease in cloud cover over central Pakistan with an increase in the hours of sunshine; a 3-5% increase in evapotranspiration[4] (ETo) due to a 0.9°C temperature increase; and a 5% increase in the net irrigation water requirement with no change in rainfall.[5] The Inter-Governmental Panel on Climate Change (IPCC) reports an increase of 0.6–1.0°C in mean temperature in the coastal areas since the early 1900s; a 10–15% decrease in precipitation in the coastal belt and hyper-arid plains; and an increase in summer and winter precipitation in Northern Pakistan over the last 40 years.[6] In a study conducted by creating synthetic scenarios of climate change in order to assess climate change impact and formulate adaptation strategies, it was found that: 'By 2020, the temperature in Pakistan is expected to increase by 0.9°C, doubling to 1.8°C by 2050. Precipitation scenarios include increases or decreases of 3% by 2020, and 6% by 2050'.[7] These studies clearly predict the changes in the weather patterns in Pakistan over the years.

The Global Climate Risk Index 2012 ranks Pakistan 8th from ten countries most affected by extreme weather events in the past two decades (1991-2010) where 'more than 90% of deaths/losses occurred in one year/event'.[8] In a research study conducted by Firdous Tabbasum, the author states 'that the frequency of occurrence of floods has increased and the next major flood may occur in the next three to five years. On the basis of this frequency pattern the study predicted that there is high probability that one major flood will occur in Pakistan every five years'[9] further intensifying the difficulties faced by women in Pakistan.

[4] The movement of water from the land to the atmosphere.

[5] See Anjum Bari Farooqi et al., "Climate Change Perspective in Pakistan" in Pakistan Journal of Meteorology Vol. 2 (3), March 2005, pp.13-14.

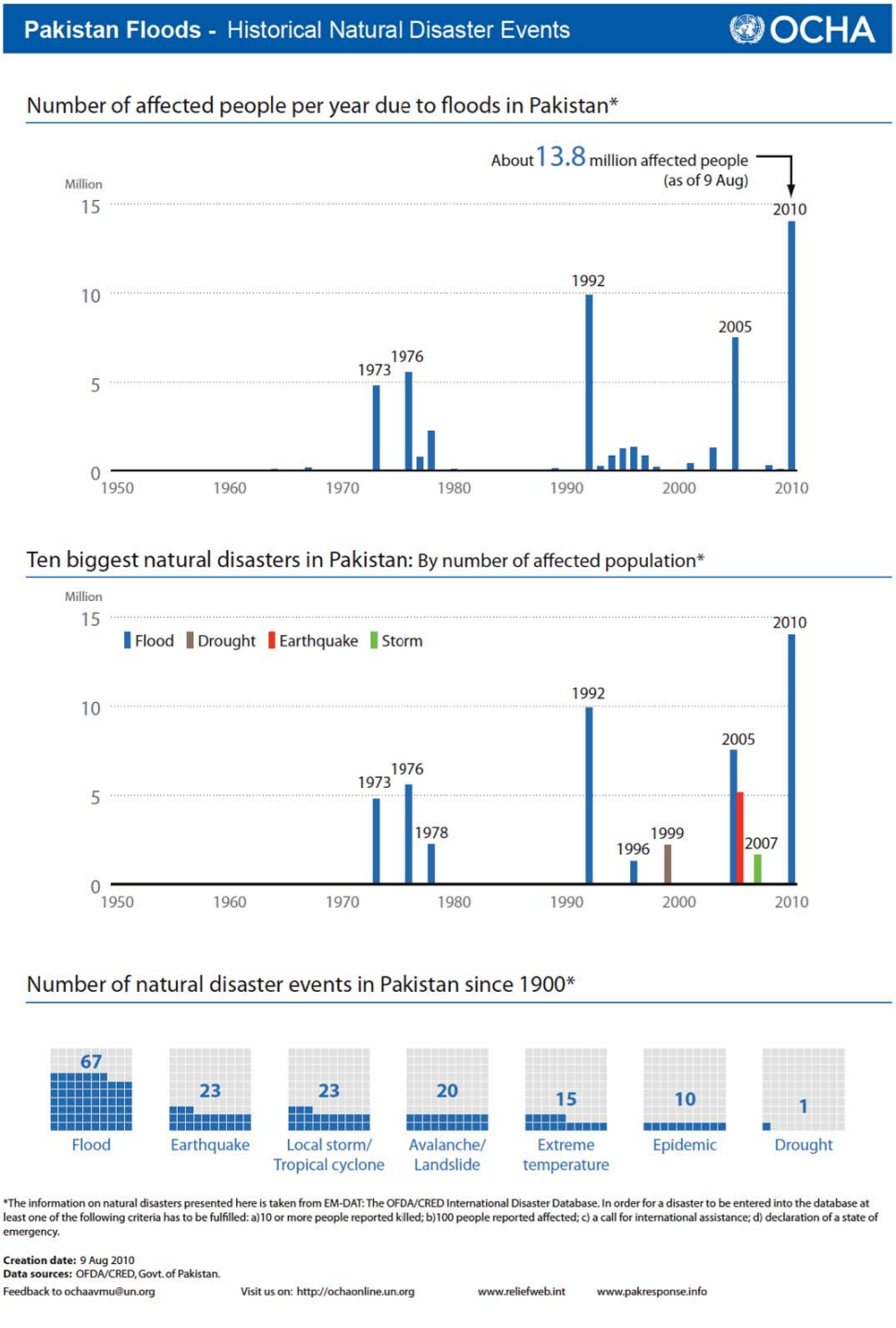
[6] Rex Victor Cruz, et al., "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," eds. M. L. Parry et al., UK: Cambridge University Press (2007) p.475. Retrieved from <http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm>.

[7] CICERO Report 2000:2, "Developing Strategies for Climate Change: The UNEP Country Studies on Climate Change Impacts and Adaptations Assessment," ed. Karen O'Brien, Norway: Center for International Climate and Environmental Research (July 2000) p.120.

[8] Sven Harmeling, pp.6,9.

[9] Firdous Tabassum, "Impacts of Climate Change on Pakistan", Unpublished M.Phil. Dissertation, Department of Environmental Sciences, Kinnaird College for Women, Lahore, Pakistan (2009) p.62.

Figure 1: Historical Natural Disaster Events in Pakistan



Source: Pakistan Flood Relief (http://pakistanifloodrelief.files.wordpress.com/2010/08/ocha1.png)

The IPCC predicts that the agricultural productivity in Asia is 'bound to decline substantially due to thermal stress and increasing occurrence of droughts and floods'.[10] Recent agriculture data for Pakistan records 30% decline in major crop yields as a result of desertification, soil fertility loss linked to water logging-salinity and floods.[11] There has also been an increase in net irrigation water requirements in arid areas. This is especially so in Sindh where the quality of groundwater is either marginal or brackish.[12] All these studies predict that the shift in the percentage of rainfall and temperature will have dire consequences on the ecological and socio-economic sector of Pakistan. As for the communities settled in the Indus area, the major lifeline of water supply is the Himalayas which are said to be receding due to global warming. This will directly impact the local inhabitants of the Indus delta and its eco-regions. Shifts in temperatures will affect sowing and harvesting patterns as well as crop yield. This change in the ecological and socioeconomic profile of these areas will ultimately translate into an increase in the burdens of the local women.

Women and Climate Change: Recent studies reveal that with shifts in weather patterns the vulnerability of women to the impacts of climate change increases. While expected to affect all sectors of society, climate change will most likely have a more severe impact on women as their roles are both reproductive and productive. According to the findings of a study by Oxfam on the impact of climate change on women farmers in Burkina Faso, the most significant impact on women is an increase in their workload. Women's reproductive role entails their responsibility of providing food for the family, tending to children and sick family members, cooking, finding water and wood, gathering and processing forest products, and working on the family farm. The time spent in search of water and wood has significantly increased as excessive deforestation and overexploitation of land has led to an inevitable scarcity in resources. In addition to their reproductive roles women are also responsible for productive tasks. These include selling and marketing products, tending to the livestock and growing crops. Men's role on the other hand is solely productive: they are responsible for growing cereals, building and maintaining the home, trading of livestock and sometimes for paid work. An important impact of climate change on women is that while they still retain their reproductive role, the burden of their productive role is increasing substantially. This negative impact on women's livelihood is never compensated for either in terms of reassigning responsibilities between men and women and promoting a fairer distribution of work, or by giving women access to and control over assets. These attitudes increase women farmers' vulnerability to climate change.[13]

Past natural disasters in Pakistan clearly show that women are the first and major group to be directly affected. The droughts of 1999 and 2000 in Balochistan (the least developed province of Pakistan) that displaced

[10] Rex Victor Cruz (2007), p.472.

[11] LEAD Scoping Study Report, "Pakistan's Options for Climate Change Mitigation and Adaptation," Pakistan: LEAD (March 2008), p. 6.

[12] CICERO Report (July 2000), p.133.

[13] Saya Saulière, "Climate Change and Women Farmers in Burkina Faso. Impact and Adaptation Policies and Practices," Oxfam Research Report (July 2011) p.5. Retrieved from <http://www.oxfam.org>.

thousands of poor families saw women and children as the worst sufferers.[14] Similarly, during the floods of 2010, a total of 713,000 women of 15-49 years of age and 133,000 pregnant women were reportedly affected,[15] and during the 2011 rain induced floods in Sindh 3,615,203[16] women were displaced.

While the impacts of climate change are widely accepted there has been no study on how it is likely to affect the women of Pakistan. This report is a small first attempt to assess how rural women perceive and experience the change in climate and how they cope/have coped with it within the context of their livelihood patterns. Selection of District Shaheed Benazirabad[17] as the study site was determined by a) it being in a flood prone area of Sindh; b) Shirkat Gah (SG) has a partner CBO, Aurat Development Organization (ADO) in the area which would facilitate entry as well as help coordinate the field work; and c) Shirkat Gah had carried out a study for World Wildlife Fund (Pakistan) in Sakrand in 2007-08 which would enable some comparison.

Wellbeing ranking exercise (Village Tali)

1.1 Objectives of the Study

The study covering four villages[18] in Union Council (UC) Sakrand, Shaheed Benazirabad District of Sindh, primarily seeks to generate evidence about the impact of climate change on local women and their livelihood strategies. It is conceptualized as a small scale qualitative study with the objective of capturing perceptions and experiences of men and women about changes occurring in their environment, how these affect their livelihoods and their response to them. Secondarily, it hopes to develop a framework and basis for similar studies in different ecological zones to highlight the interconnections between climate change, livelihoods and women towards effective policy formulation and programmatic interventions.

1.2 Methodology

Shirkat Gah employed a three pronged methodology for the study (July-October 2011):

- **Selection of the Study Area:** The area was selected on the basis of purposive sampling to ensure the inclusion of a cross

[14] Bushra Khaliq (2012).

[15] Pakistan Monsoon Floods. Immediate Needs for Women and Children Affected by Monsoon Floods. 5 August 2010. Retrieved from, <http://www.unicef.org/infobycountry/files/UNICE__Immediate_Needs_Document_for_Pakistan_5_August_2010.pdf>.

[16] National Disaster Management Authority Summary of Losses/Damages due to rain in Sindh 2011 Period covered up to 09 December2011. Retrieved from <http://www.ndma.gov.pk/Documents/monsoon/Sindh/Losses_Damages_09Dec2011.pdf>.

[17] Formerly known as Nawabshah, the name was changed to District Shaheed Benazirabad in 2008.

[18] Tali, Dhang, Mir Mohammad Lakho and Ghandia.

Social mapping being conducted in Village Tali

section of castes/ethnicities, economic groups, and fair representation of the various types of communities in the District e.g. forest-dependent, river-dependent, etc. Four villages (Tali, Dhang, Mir Mohammad Lakho, Ghandia) in UC Sakrand, Shaheed Benazirabad District of Sindh were selected as sites for the study covering an approximate population of 1800-2000 inhabitants.

- **Secondary Data Collection:** A desk study was conducted to review secondary data on climate, weather and flood patterns over the past two decades in the study area. District level records from relevant government departments, as well as published material, reports, maps, etc. were used to provide the context and background. Mapping of existing NGOs working in the area was done through the internet and by ADO, SG's community-based partner.

- **Fieldwork:** The fieldwork was done in two phases in partnership with ADO. The first phase comprised of selection of the field team and their training. Field guidelines were developed in English and Urdu and questions were drawn up for social and institutional mapping. ADO designated three staff members (two females, one male) for the field research with the SG staff team (which consisted of two females and three males). An in-depth 5-day training on Participatory Rural Appraisal (PRA) was then conducted in Karachi by SG trainers with in-depth briefing on climate change and livelihoods. The training covered basic PRA philosophy, methodology and tools for specific subject areas, documentation, and simulations/role playing. The tools were then pre-tested in the field. The schedule for the field work was charted out and team members were designated their roles (note takers, facilitators, etc.), timelines and sites. In the second phase two teams with two male and two female members each were formed with the specially trained SG and ADO researchers. Different PRA tools were used including decade matrix, impact diagram, seasonal calendar, social mapping, social ranking and Venn diagrams. In addition focus group discussions (FGDs) and in-depth

Impact diagram exercise being carried out with men (Village Tali)

interviews were also undertaken. FGDs were conducted separately for males and females to generate information on livelihood patterns, natural resource use, perceptions on climate change and strategies used to cope with the change. A total of 61 FGDs were conducted in all four villages between July and August 2011 (17 in Dhang, 15 in Ghandia, 17 in Mir Mohammad Lakho and 12 in Tali village). Sixteen case studies were recorded in the four villages (2 in Dhang; 6 in Ghandia; 3 in Meer Mohammad Lakho; and 5 in Tali). A total of 1,684 local analysts were engaged for the PRA tools (993 women; 691 men).

As rains started soon after the completion of the field research (02-08-11) and induced unprecedented floods, a second round of FGDs was conducted with flood affected/displaced women and men in the same villages. The objective was to elicit information about the damage caused by the flood and gain additional insights about people's preparedness and perceptions regarding the long term impact of the disaster.

1.3 Problems in the Field

The initial problem faced by the team was that the locals in one of the selected villages changed their minds about participating in the research. Hence a new village had to be identified, which resulted in a delay in starting the fieldwork. The other challenge was from heavy rains that diverted the field teams' attention to the provision of relief and the consequent delay in field analysis. While the floods were an opportunity to document at first hand the villagers' experiences and strategies, the gaps in the earlier rounds could not be taken up in the face of the immediate tragedy and follow up.

Venn diagram exercise with women in Keeria Mohallah, Village Tali

1.4 Report Structure

The report comprises three sections. The first section provides a profile of the study area compiled through the desk review and available official documents. This section is an overview of District Shaheed Benazirabad's population, agriculture, education, and infrastructure. Information, where available, at Taluka[19] level has been incorporated. It also provides an analysis of the change in climatic conditions and weather patterns of the district.

Section two consists of the findings from the four selected villages. This section also presents the difficulties faced and the relief efforts in the villages during the floods. The last section draws conclusions and makes recommendations based on the findings.

[19] A mid-level administrative unit with the district above and union council below it.

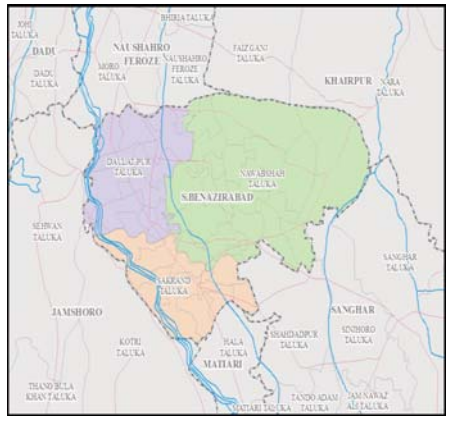
Chapter 2

District Shaheed Benazirabad: A Profile

The area under study is located in Sindh province, the second largest province of the country with a total land area of 14.09 million hectares (ha) (34.82 million acres) constituting 17.7 percent of the country's geographical area.[20]

The name of District Nawabshah was changed to District Shaheed Benazirabad in 2008. It is located 50 meters above sea level and lies between 25°59' to 27°15' N latitudes and 67°52' to 68°54' E longitudes.[21] The district has four talukas,namely Nawabshah, Daur, Sakrand and Qazi Ahmed which comprise a total of 51 UCs. Taluka Sakrand has 12 UCs and 58 mouzas.[22] This study covers four villages located in three UCs of Taluka Sakrand.

Figure 2: Map of District Shaheed Benazirabad



Source: Provisional Disaster Management Authority, Government of Sindh

[20] Indus for All Programme, "Study of Riverine forest upstream Sukkar and downstream Kotri," Pakistan: World Wildlife Fund (2008) p.2. Retrieved from <www.foreverindus.org>.

[21] Public Private Partnership Unit (PPPU) and Planning and Development Department, "Establishment of Special Economic Zones (SEZ) in Sindh, Modified PC-1," Pakistan: Government of Sindh (2009) p.16.

[22] Statistics Division, Agricultural Census Organization, "Sindh 2008 Mouza Statistics," Government of Pakistan (2009) p.5. The Pakistan Agricultural Census 2000 defines a mouza as a "demarcated territorial unit for which separate revenue record including a cadastral map is maintained."

Table 1: Study Area

Province	District	Tehsil (Taluka)	UC	Population	Selected Villages
Sindh	Shaheed Benazirabad	Sakrand (233,298 pop)	Ghoram Mari	12,134	Meer Mohammad Lakho
			Sakrand-2	19,723	Tali
			Mehrabpur	24,740	Ghandia
					Dhang

Source: www.pdma.pk/dn/portals/0/popu-Benazirabad.pdf

In the overall ranking of the most deprived districts in the province of Sindh, District Shaheed Benazirabad is categorized at the medium deprivation level with 27% of the total population of the district documented as deprived (Deprivation Index:[23] 60.44).

Table 2: District Deprivation Level

District		Provincial Rank Order	National Rank Order	Deprivation Index
		1= Least Deprived 16= Most Deprived	1= Least Deprived 100 = Most Deprived	(1-100)
Shaheed Benazirabad	Total population	6	29	60.44
	Urban	3	13	38.16
	Rural	8	50	69.64

Source: Pakistan Development Review[24]

District Shaheed Benazirabad has a game reserve, the Pai Forest, which is situated on the eastern side of the River Indus near Sakrand town of District Shaheed Benazirabad at a distance of 5 km adjacent to National Highway. The Pai Forest covers a total area of 1933 ha.[25] Tali village (one of the selected villages for study) is located in UC Mehrabpur and falls in Pai Forest. Among the wildlife supported by the forest is the hog deer. The local inhabitants of the surrounding villages depend on the forest for firewood, timber and grazing land.[26]

Population: The population of District Shaheed Benazirabad is 1.578 million calculated by projecting an annual increase of 2.8% on a population of 1,102,584 in 1998 and is spread

[23] The Deprivation Index is based on the following indicators: education, health, housing services, employment, sectoral indices and housing quality.

[24] Haroon Jamal et al., "Mapping the Spatial Deprivation of Pakistan" in Pakistan Development Review 42 (2): 91-112, Islamabad: Pakistan Institute of Development Economies (2003). Retrieved from <http://www.biomedsearch.com/article/Mapping-spatial-deprivation-Pakistan/202518965.html>.

[25] Dr. Surayya Khatoon and Dr. Ghulam Akbar, "Natural Vegetation Assessment," Indus for all Programme, Pakistan: World Wide Fund for Nature (2008), p.97.

[26] Shirkat Gah Women's Resource Centre, "Preliminary Socio-Economic Baseline Study Report," Indus for all Programme, Pakistan: World Wide Fund for Nature (March 2007), p.14.

over a total area of 4,504 square kilometres.[27] Growth rate trends of the District, however, were at the rate of less than 2 percent from 1981-1998. According to the 1998 census, the male-female ratio in the District population was 51.86% males to 48.14% females and reflected the national negative sex ratio. The District is largely rural with 72.3% of the population living in rural areas; the rest (27.7%) is urban. The total fertility rate (TFR) of the District[28] is higher than the national rate of 4.1.[29]

Table 3: Total Population and Average Annual Growth Rate according to the Census 1998 of District Shaheed Benazirabad

Area (sq. km)	Census 1998						Average Annual Growth Rate	Average Annual Household (HH) size
	Total Population	Male	Female	Urban population	Rural population	Population density		
4502 sq. km	1071533	555677	515856	282359	789174	238 per sq. km	1.63 %	6.0

Source: Census Report of District Shaheed Benazirabad, 1998

According to the Sindh Mouza Census of 2008, women in 42 mouzas are linked to agriculture for livelihood and in 22 mouzas to labour. Other female livelihood related tasks are *ralli* (patchwork quilts) making, livestock and chicken rearing.

Socio-economic Indicators: The poverty index of Sindh province shows that the poverty is higher in rural areas as compared to urban areas mainly because of the dual nature of the province's economy.[30] In the ranking of the Human Development Indices (HDI), District Shaheed Benazirabad moved up the ranking order from 52 (HDI 0.5278) in 1998 to the position of 14 (HDI 0.6921) in 2005. There has been a 3.9% annual rate of change in the HDI of District Shaheed Benazirabad.[31] According to the Rural Poverty Indices, 36.46% of the rural population of the District lives below the poverty line[32] with a monthly income of less than $1.25 per household.[33] Food insecurity is high (ranked 78th out of 131 districts) with 57.5% of the District's population facing insecurity of food.[34]

[27] Rehabilitation Department, Provincial Disaster Management Authority, "Sindh Provincial Monsoon/Floods Contingency Plan 2011 (Draft Version 1.0)," Pakistan: Government of Sindh (2011) p.29. Retrieved from <http://www.pdma.pk>.

[28] According to the Population Welfare Department, Government of Sindh, the TFR of District Shaheed Benazirabad is 5.4. <http://pwdsindh.gov.pk/districts/Nawabshah.html>.

[29] Pakistan Demographic and Health Survey (PDHS) 2006-7, p.xx.

[30] Social Policy and Development Centre (SPDC), "Social Development in Pakistan. Annual Review 2004. Combating Poverty: Is Growth Sufficient?" Social Policy and Development Centre (2004), p.59. Retrieved from <http://www.spdc.org.pk>. A dual economy is defined as an economy where both technically advanced and technically primitive sectors exist, such as in developing countries where advanced technology is used for extracting minerals or manufacturing while at the same time large parts of the country exist at subsistence level. <http://www.businessdictionary.com/definition/dual-economy.html>.

[31] Haroon Jamal and Amir Jahan Khan, "Trends in Regional Human Development Indices," Research Report No. 73, Social Policy and Development Centre (2007) pp.8,13. Retrieved from http://www.relooney.info/SI_Expeditionary/Pakistan-Economy_104.pdf>.

[32] Haroon Jamal, "In Search of Poverty Predictors: The Case of Urban and Rural Pakistan," Research Report No. 59, Social Policy and Development Centre (2004) p.20 Retrieved from <http://www.spdc.org.pk/Publications/Research%20Reports/RR-59.pdf>.

[33] Dr. Abid Qaiyum Suleri and Sahib Haq, "Food Insecurity in Pakistan," SDC, SDPI, WFP, (2009) p. 69.

[34] Dr. Abid Qaiyum Suleri and Sahib Haq (2009) p. 101.

Table 4: Ranking of Different Socio-economic Indicators of the Rural and Urban Population of District Shaheed Benazirabad

	Poverty %	Literacy %	Female Literacy	Population per Health Unit %	Population per School %	Sewerage %	Tap Water %
Rural	19	74	75	47	46	50	58
Urban	12	20	28	34	14	21	22

Source: PIDE Working Papers: 43 (2008)[35]

The female literacy rate of the district is 21% which is ranked at 60th position among the 131 districts according to the District ranking of female literacy of 2009.[36] There is a slow but steady increase in the literacy rate of males and females, an indication that there is a growing trend to send children to school. The District has two hospitals (895 beds), 25 dispensaries, 9 Rural Health Centres (RHC), 36 Basic Health Units (BHU) and 2 Mobile Health Units (MHU).[37]

Table 5: Literacy Rate (10 years and above) by Gender and Location in District Shaheed Benazirabad - 1998 and 2001

Year	All Areas			Urban			Rural		
	Both sexes	Males	Females	Both sexes	Males	Females	Both sexes	Males	Females
1998	34.13	47.62	19.62	54.26	64.94	42.96	26.47	41	10.89
2001	37.04	50.95	22.45	55.95	66.31	45.11	28.56	43.96	12.14

Source: Ministry of Education[38]

Infrastructure: The percentage of kacha[39] houses in the District is 57%, and in 5 mouzas 75% of the houses are made of mud. Only one mouza has a cricket ground for men while there is no playground anywhere for girls. About 4.21% households lack adequate drinking water facility and 8.5% lack toilet facility. According to the Sindh 2008 Mouza Statistics, 57 of the 58 mouzas in Taluka Sakrand use hand pumps (1860 in all) to meet their drinking water needs and 43 from among them, a combination of hand and private electric pumps. Only one has a piped water supply. With reference to the taste of the drinking water, 55 mouzas reported it to be sweet while 3 to be brackish. On paper five mouzas have filtration facility for drinking water whereas SG's mapping shows there is only one filtration plant in Taluka Sakrand (Chandia village near UC Mehrabpur) and that too is non-functional. Similarly, out of 8 water supply schemes in Sakrand only 2 are functional with each serving a population of 20,000; the rest are non-functional reportedly due to lack of

[35] Rizwana Siddiqui, "Income, Public Social Services, and Capability Development: A Cross-district Analysis of Pakistan," PIDE Working Papers 2008:43, Islamabad: Pakistan Institute of Development Economics (2008) p.19. Retrieved from <http://www.pide.org.pk/pdf/Working%20Paper/WorkingPaper-43.pdf>.

[36] Dr. Abid Qaiyum Suleri and Sahib Haq (2009) p. 87.

[37] Planning and Development Department, "Sindh Vision 2030," Pakistan: Government of Sindh (2007) p.74.

[38] Ministry of Education, Chapter 4 Sindh, Facts & Figures Pakistan 2002, EFA Wing, Islamabad.

[39] A residential place, the walls of which are made of mud or unbaked bricks bonded with mud.

funds.[40] The quality of water in the area is deteriorating creating economic and social problems with an additional threat of arsenic contamination that was found in 10% of the samples taken by the Irrigation Department in a survey conducted in 2006 (100 ppb or above) in the District.[41] Thirty-two mouzas have toilet facility inside the house while 26 utilize open spaces. Electricity is available in 9 mouzas and only in a few houses in another 36 mouzas, while 4 mouzas have no electricity. Fifty-seven of the mouzas in the Taluka use firewood as fuel, 37 use dung cake and only 7 have access to sui gas.

The number of Non Governmental Organizations (NGOs) registered with the Social Welfare Department of Sindh Government has increased to 5,526 in the province. Reportedly, 278 NGOs are registered as working in District Shaheed Benazirabad.[42]

Agriculture and Livestock: Nearly half of the population in Sindh lives in rural areas, the majority of which is dependent on agriculture for their livelihood. In all 58 mouzas of Taluka Sakrand, agriculture is the main source of occupation for the majority of men and women. The major crops of the area are wheat, cotton, banana, sugarcane, chillies and different vegetables (based on SG's mapping). District Shaheed Benazirabad ranks 110 among the 137 districts in terms of crop based self-sufficiency, 117 in animal based food self-sufficiency, 46 in maize, 60 in rice, and 126 in wheat self-sufficiency.[43] Of these 58 mouzas, wheat is the major crop in 55 mouzas, rice in 4, cotton in 54, sugarcane in 33, and orchards in twenty.[44] The high self-sufficiency however does not translate into food security for all as is reflected in the deprivation levels (half of both rural and urban are assessed deprived. See Table 2). The livestock sector in Pakistan, both dairy and cattle breeding, contributes to 11.4% of the GDP.[45] In rural areas livestock husbandry is closely associated with agriculture. Taluka Sakrand has a total of 260,500 buffaloes, 210,540 cattle, 231,690 goats and 55,800 sheep.[46]

Table 6: Total Livestock Population in Selected Villages

Villages	Livestock			
	Buffaloes	Cattle	Goat	Sheep
Meer Mohammad Lakho	3818	2961	2218	615
Tali	3855	2830	2224	980
Ghandia	3011	2236	2400	989
Dhang	2850	21037	2890	1265

Source: District Livestock Officer District Shaheed Benazirabad, November 2011

[40] Dr. Muhammad Aslam Tahir et al., "Technical Assessment Survey Report of Water Supply Schemes. Sindh Province," Provision of Safe Drinking Water Project, Pakistan Council of Research in Water Resources, Ministry of Science and Technology, Islamabad (November, 2010), p.92.

[41] Sindh Irrigation and Drainage Authority, Sindh Water Sector Improvement Phase-1 Project, Preparation of Regional Plan for the Left Bank of Indus, Delta and Coastal Zone, Report Summary-Task I-33 (Draft) (December 2010), p79. Retrieved from <http://www.sida.org.pk>.

[42] <http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/karachi/21-Jun-2009/NGOs-mushrooming-in-Sindh>

[43] Dr. Abid Qaiyum Suleri and Sahib Haq (2009) pp.38, 40-1, 43, 46.

[44] Sindh 2008 Mouza Statistics (2009) p.8.

[45] Sindh Vision 2030 (2007) p.100.

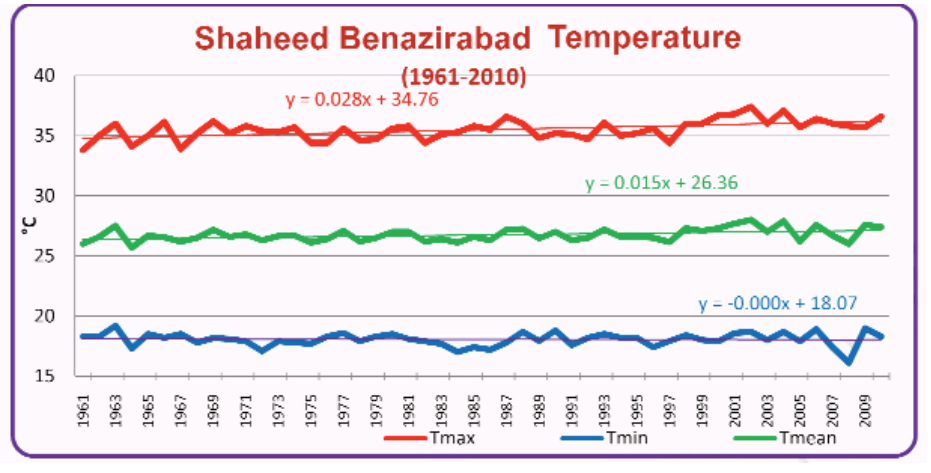
[46] District Livestock Officer District Shaheed Benazirabad, November 2011.

2.1 Weather Patterns

District Shaheed Benazirabad is located in Pakistan's arid zone and receives 134.3mm of mean annual normal precipitation. There has been a fluctuation in the weather patterns of the district. According to the data of Pakistan Meteorological Department, the intensity of rainfall is increasing and there has also been an increase in the trends of maximum temperatures.

The heat index patterns of Pakistan show a changing trend with heat gradually increasing from the south to the north. District Shaheed Benazirabad lies within extreme danger level as the index increases from May-July from forenoon to afternoon hours resulting in heat strokes and sunburns in both humans and animals.[47] Heat index values for the District from 1961 to 2004 show the highest values to be in June: 68.7°C (April: 51.3°C, May: 66.0°C, June: 68.7°C, July: 65.9 °C and September: 58.7°C).[48] In contrast, the chill index in winters is normal (not greater than -13°C) and has no unpleasant impact on the human population.

Figure 3: Weather Patterns of District Shaheed Benazirabad from 1961- 2009



Source: Pakistan Meteorological Department

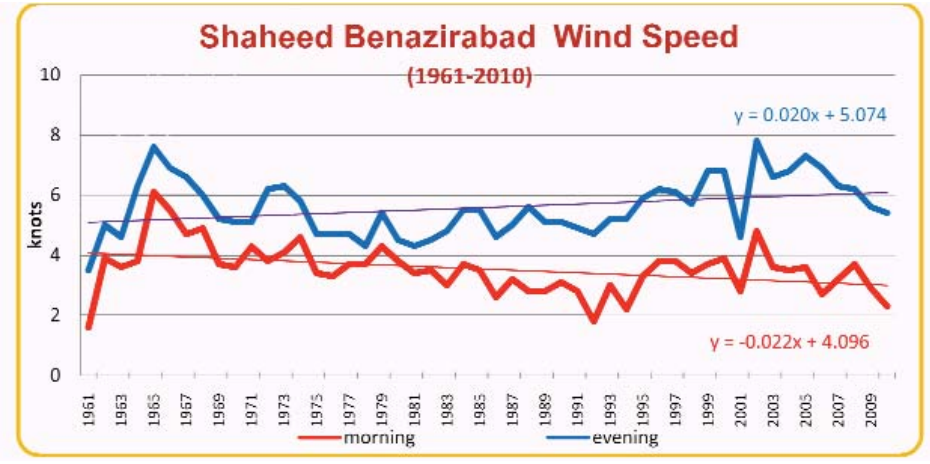
According to Hussain et al., District Shaheed Benazirabad showed a slight increase of +0.4 days in dust storms frequency from 1991-2000 while overall in the province there was a decrease in the frequency of dust storms. The District has been ranked as low frequency (dust storm days 1.1 to 3.0 days) from the year 1991-2000.[49] The mean yearly number of thunderstorm days recorded in District Shaheed Benazirabad from 1961-1990 were 8.18 days with an increase in thunderstorm days in the month of August.

[47] Maida Zahid and Ghulam Rasul, "Rise in Summer Heat Index over Pakistan" in Pakistan Journal of Meteorology Vol. 6, Issue 12: 2010:85-96. The authors define the heat index as "a measure of the stress placed on humans by elevated levels of atmospheric temperature & moisture. As the atmospheric moisture content increases the ability of human body to release heat through evaporation is inhibited thereby causing discomfort and stress."

[48] Muhammad Sohail Gadiwala and Naeem Sadiq, "The Apparent Temperature Analysis of Pakistan using Bio-Meteorological Indices" in Pakistan Journal of Meteorology Vol.4, Issue 8: January 2008: 15-26.

[49] Ata Hussain et al., "Analysis of Dust Storms Frequency over Pakistan During (1961-2000)" in Pakistan Meteorological Journal, Vol. 2, Issue 3: March 2005: 49-68.

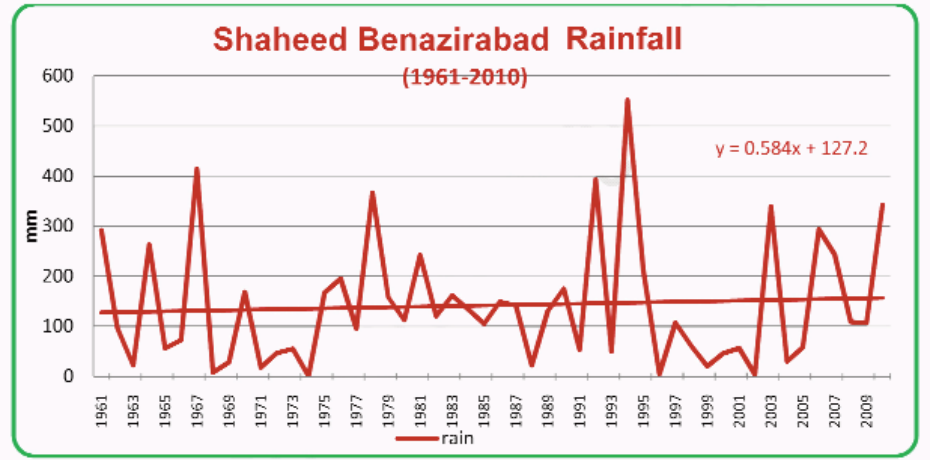
Figure 4: Change in Wind Speed of District Shaheed Benazirabad from 1961- 2009



Source: Pakistan Meteorological Department

Data from the Meteorological Department showed fluctuation in the wind speed of District Shaheed Benazirabad – high intensity from 2002-2003 and a decreasing trend from 2003 onwards – with an increase in wind speed in the evening and decrease in the morning. Rainfall patterns fluctuate and show an increase in rainfall every 3 years. On an average 249mm rainfall was recorded from 2001-2009 in the District with a maximum of 350mm recorded from 2003-2010.

Figure 5: Rainfall Pattern of District Shaheed Benazirabad from 1961-2009



Source: Pakistan Meteorological Department

Table 7: Rainfall Pattern of District Shaheed Benazirabad

Year	Rainfall (mm)
2001	56
2002	4
2003	340
2004	30
2005	58
2006	273
2007	243
2008	112
2009	107
2010	343

Source: Pakistan Bureau of Statistics[50]

2.2 Flood Patterns

The population of Sindh living in low-lying floodplains is most prone to floods. The District has in the past been hit by floods in 2003, 2010 and 2011 due to a combination of factors which include rainfall, inadequate storm water drainage and water coming from upper Nara Basin carried by Left Bank Outfall Drain (LBOD). According to the Sindh Provincial Monsoon/Floods Contingency Plan 2011 (Draft Version 1.0), Guhram Mari and Mehrabpur (UCs of Taluka Sakrand) are the most vulnerable population centres along the waterways.

[50] http://www.pbs.gov.pk/sites/default/files/other/yearbook2011/Climate/3-2.pdf

Chapter 3

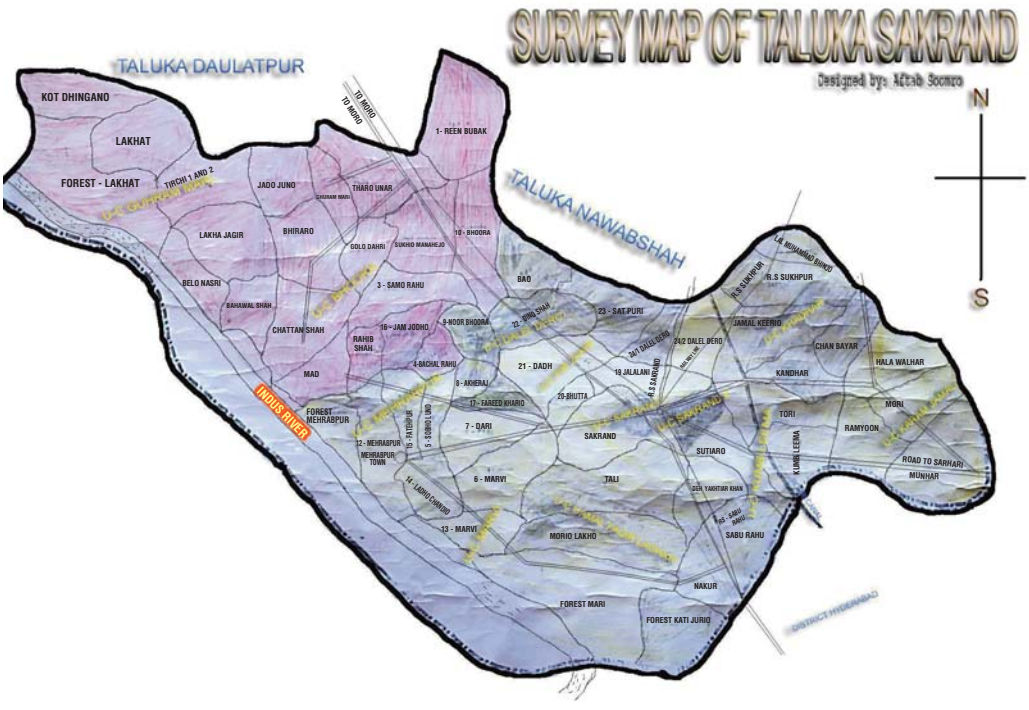
Findings from the Selected Sites

3.1 Description of Selected Villages

Agriculture and livestock, labour, wood and fodder collection, stitching, embroidery, drawstring and *ralli* making are the main sources of livelihood in the four selected study villages. There is also considerable dependence on natural resources. Major crops cultivated as identified by the locals are sugarcane, rice, wheat, banana, millet, cotton, chilli, onion, jowar, spinach, coriander, carrot, raddish, melon and various fodder crops. Wood, dung cake and cotton stalks are used for fuel. All the villages have electricity.

Dhang: The village comprises a total of 175 houses with seven distinct mohallas (neighbourhoods). Houses are mostly made of mud and bricks. Villagers cultivate sugarcane, cotton, wheat, jowar and chilli. Almost all the villagers own livestock. Women's livelihood is found to be linked to embroidery, *ralli* making and cotton picking while men bring fodder for livestock. There is only one girls' school but that too is closed due to unavailability of teachers. There is one boys' school. There are two teachers and the students are expected to carry out their personal chores. Regarding the infrastructure, different government organizations and departments are located in the village. These include a police station, and education, health and agriculture departments. There are also offices of Water Resources and Power Development Authority (WAPDA), State Life Insurance, Union Council Works and Services Department as well as a branch of Khushali Bank. Mobile telecommunications and FM offices represent the private sector. There is only one hospital (a BHU) in the village where the doctor reportedly visits only when the polio team comes. Therefore, people

Figure 6: Map of Taluka Sakrand



have to go to the Government hospital in Sakrand. There was a riverine forest 15 years ago near the village but it was cleared by local landlords for cultivation. For fuel wood the villagers usually get wood from the other side of the river, but during high tides, they use cotton stalks and dung cakes. There are five shops in the village.

Meer Mohammad Lakho: The village comprises eight neighbourhoods with more than 400 houses. Lakha and Malah are the two major castes of the village. There is only one boys' school near Meer Bahar which is non-operational, depriving more than 1000 children of education. Villagers reported that there was a forest (Lakha Jhageer) to the east of the village which has been cleared for agriculture. Most people of the village are either involved in labour or agricultural activities. Villagers reported that there was no shortage of water in the area. Some of the residents had hand pumps in their homes. Diesel engines were used to pump underground water for the crops. There is no social/non-governmental organization in the village. The village has six shops, one of which is run by a woman. Villagers cultivate wheat, mustard, cotton and vegetables such as onions and chillies. Women work in the fields with the men; they also harvest, cultivate and pick cotton. During the social mapping it was reported that there is no toilet facility in the homes which is problematic for women.

Ghandia: The village has houses made of mud, bricks and some have thatched roofs. Men are engaged in wage labour and work in agricultural fields while women pick cotton,

transplant rice, and work in sugarcane plantations, as well as collecting fodder crops. Fodder in the village is free. Most of the boys go to school in the village or to private schools in Sakrand. Those belonging to the Zardari caste own land and livestock, and their children are employed in the public sector. The poor people of the village are landless. The people in Ghandia are familiar with the institutions and organizations operational in their area, however most of these are viewed with mistrust. The local police station is not frequented by most of the villagers; they only go there to report a theft. The common practice is for landlords to go there for their own complaints or on the community's behalf. The village does not have gas, ambulance service, a hospital or a girls' school - there is a boys' school. Poverty pushes people to send their children to work in the fields where they earn up to Rs.250 a day but this prevents them going to school even if they want to. There are some girls from better off homes, however, who go to a school outside the village. The imam of the mosque is paid Rs.2000 a month by the community to support him. Inadequate incomes force people to take loans for extra or unexpected expenses like weddings, crop cultivation, pesticides or illnesses. These are individual loans and rarely taken by women; group borrowing is also practiced but this is only to purchase livestock.

Tali: The situation of Tali village is much better than the other villages even though only 4 or 5 people in the village own land (20-25 acres). Pai Forest located near the village was officially declared a game reserve in 1972, and is famous as a hunting ground for black and grey partridges. Women belonging to rich families are educated and have jobs. Those from poor families work in the fields and are involved in cultivation and harvesting of different crops; they also embroider, stitch and pick cotton. Men belonging to rich families are engaged in business, politics or jobs whereas those who are poor either work in fields or are wage labourers. Banana, sugarcane, wheat and cotton are the major crops, but vegetables and fodder are also grown. Approximately 50% of the villagers collect wood from the Pai Forest for fuel and to sell. Various institutions and organizations such as the Sindh Seed Corporation, Agricultural College, Horticulture Research Centre and Stitching Centre are operational in the village. All these organizations train people with the objective of providing men and women with a means of livelihood. There is a government hospital and two schools in the village. According to the respondents 70% of the villagers are educated.

3.2 Major Resources and Livelihood Patterns of Different Classes Identified in the Selected Villages

According to participants in the research the resource use patterns of all the study villages are somewhat similar with only a slight difference. On the other hand, the resource use patterns of different classes are varied. According to the analysis of the economically disadvantaged group most people in Ghandia village are poor and the villages are divided on socio-economic lines: landlords (own agricultural land and hire the community to work on it) or rich shopkeepers, the poor and the very poor (or the "working class").

Landlords control the sugarcane crops. They also have tractors and other mechanical agricultural equipment, livestock, live in

bungalows and own personal cars, and have bank accounts. The women stay at home and have domestic help for household chores. The women go to the city for treatment when they are unwell. A lot of landlords have moved to the cities in recent years.

The other class is the employed class; they are neither labourers nor landlords. They are teachers, policemen, clerks, peons, etc., employed by the Army or the Government. They live in brick houses and are considered to constitute the middle class in the village. In most cases the women do not work but do play a decision-making role on how the family income is spent. They own motorcycles and can afford to rent cars for long distance travel. The middle class owns televisions. Women

Table 8: Wellbeing Ranking

Villages	Characteristics Of Different Classes Based On People's Perception			
	Rich	Middle	Poor	Very poor
Ghandia	• Landlords • Own livestock, bungalows, cars, land and bank balance	Have jobs Live in brick houses, own motorcycles and TVs	• Labourers • Live in mud houses • Have very little livestock • Women stitch and embroider, work in fields, sell milk and eggs	• Widows • Live in broken mud houses • Receive charity • Wear dirty clothes
Dhang	• Have jobs, land, houses, cars • Children go to schools in the city • No worries/tensions		• Can afford one meal per day • Daily wage labourers • Women embroider and pick cotton • Have many children, no schooling • Take loans • Don't have money to marry daughters	
Meer Mohammad Lakho	• Have livestock, money, furniture, land (50-100 acres), agricultural machinery, jewellery and motorcycles. • Children go to school		• Have 1-2 buffaloes and 2-5 acres land • Are labourers and/or work on farms • Women collect wood, work in fields and embroider, stitch and make *rallis* • Take loans • Have many children, no schooling	• Have a goat or hen • Do not have a house or job • Beggars
Tali	• Landlords, businessmen, politicians, and government employees (women are employed) • Have livestock, motorcycles and brick houses • Children (boys and girls) study up to university level • Go to private clinics and hospitals	• Have jobs, work in fields, are tractor drivers, women embroider • Have livestock, TVs, mobiles • Take small loans • Consult government hospitals	• Labourers • Have TVs, bicycles, take small loans • Live in mud houses • Illiterate	

tend to spend on their children.

Wellbeing is considered by the locals as having a good crop that benefits the poor. The younger members of the community felt it meant well-paid employment or running your own business successfully.

The poorest people in the community are agricultural labourers and live in mud houses. They send their children to government schools if they can but in most cases their children work on the land with them to supplement the family income. Daily wages count hence they cannot afford to take even a few hours off from work. The women from this class stitch or embroider as a means of regular income. Their income is crucial for the family. Widowed women are considered to be the poorest of the poor in the community. They receive charity, live in mud houses or are homeless in some cases. Their children do not have the opportunity to get an education.

Table 9: Occupation of Villagers According to Different Classes

Villages	Women		Men	
	Rich and Middle	Poor	Rich and Middle	Poor
Dhang	Employed in educational institutions and/or bank, embroidery (for domestic use only)	Livestock husbandry, embroidery, drawstring-making, farmers, working in chilli and cotton fields	Cultivators, farmers, shopkeepers teachers, factory labourers	Farmers, labourers, cotton and chilli picking
Tali	Teaching, work in NGOs, field assistants, politicians, agriculturists, embroidery, drawstring-making, stitching, *ralli* making, tie bundles of sugarcane, coriander and mint	Make hats and drawstrings, collect wood, labour, *ralli* making, stitching, tie bundles of sugarcane, coriander and mint	Agriculturists, contractors, business, jobs	Fishermen, farmers, labourers
Ghandia	School teachers	Women pick cotton, cultivate rice, sugarcane, cotton and fodder crops	Agriculturists, government jobs	Labourers and work in fields
Meer Mohammad Lakho	Stitching, embroidery, housework and *ralli* making (for domestic use only)	Cotton picking, embroidery, stitching, livestock husbandry at reduced wage	Cultivators, agriculturists, shopkeepers, farmers	Labour in Karachi or work as drivers

3.3 Role of Women

Women play a reproductive as well as a productive role. They play a major role in contributing to the socioeconomic condition of their families. They are connected to forest resources as collectors of fuel wood; they fetch water from rivers and streams; and they rear livestock and poultry. Women in the selected villages were found to be multi-tasking: working in houses, doing daily household chores, looking after livestock along with income generation through embroidery, stitching, making *rallis* and drawstrings, cotton picking, cultivation of sugarcane and wheat, sowing seeds, harvesting of chillies, wheat and rice, threshing, and making wheat bundles. Discussions in focus groups revealed that the women belonging to rich families were the only ones not linked to any source of livelihood; those from the middle and poor classes were associated with various means of livelihood for their families.

In village Meer Mohammad Lakho women's major responsibility entails collecting water as only a few houses have a water system. Those without running water need to go to other houses to wash clothes or bathe. A female local analyst from the upper class said that all decision making authority lies with men; women are not allowed to go anywhere without the permission of their husbands nor can they use mobiles. If someone owned a mobile phone its use was monitored by male family members.

The women, like in the other villages, engage in embroidery, stitching, and *ralli* and drawstring making (and other crafts) to supplement their income or in financially difficult times. They receive Rs.100 to embroider a suit and Rs.1000 for a dupatta. It takes 15 days to complete one *ralli* and some women finish four of them in 1 month (it costs Rs. 400 to buy materials for 4-5 *rallis*) and they are paid Rs. 250 per *ralli*. This is usually done in their spare time and is not the main source of livelihood for most. Women's work changes with seasons: in the summer they spend more time washing clothes, fetching water, etc. In the winter they are mostly engaged in arranging for firewood, embroidery and *ralli* making.

Table 10: Income Generation through Different Means

Villages						Agriculture work		
	Stitching (Rs)	Hat making (Rs)	Drawstrings (Rs)	*Ralli* making (Rs)	Embroidery (Rs)	Cotton fields (Rs)	Chilli fields (Rs)	Onion and vegetable fields (Rs)
Tali	25/day	25/day, Earn 800 to 1500 from mirror hats	25/day			One woman can pick 250kg of cotton per day and earn only Rs50/day.		100
Meer Mohammad Lakho	70-100/suit		50-200	500 to 2000	Varies from100-1000	120-150/maund		
Dhang				1500	500-4000	100/day	100/day	
Ghandia					400-2000	100/day		

3.4 Perceptions of Climate Change

The increase in natural disasters has made people feel more vulnerable to the impact of climate change. Local perceptions in the selected sites regarding climate change were assessed by using the recall method to capture their experience of change over the last two decades. Changes in weather and the increase in the severity and frequency of natural disasters were linked to the anthropogenic activities. The participants stressed the point that though the climate was changing, it was the degradation of the environment by human activity that was exacerbating the impacts of natural disasters. The increase in use of pesticides was often cited as a contributing factor. The ecological and social effects of climate change identified included higher rates of evapotranspiration, extinction of bird, animal and plant species, and a negative impact on people's productivity.

The local analysts repeatedly emphasized that the present day weather was very different than 20 years ago. They were cognizant of the changes in patterns of rainfall, winds and floods and felt that the summers now were hotter and winters colder. Furthermore, the weather was more unpredictable and added to the troubles of local communities already struggling to adapt to a changing climate. The biggest natural disasters occurring in the last 20 years were perceived to be the floods (in 2010) and the earthquake (which struck northern Pakistan on 8th October 2005 and did not directly affect them). Women in Meer Mohammad Lakho belonging to the poorer strata believed that floods, rains, lightning and winds were the most dangerous and devastating forms of natural disasters.

It was felt that the extremes in temperature began in 2001 with the summer heat becoming unbearable and the winter extremely severe. The duration of summer has also increased and now lasts for 8 to 9 months. The male respondents from Dhang

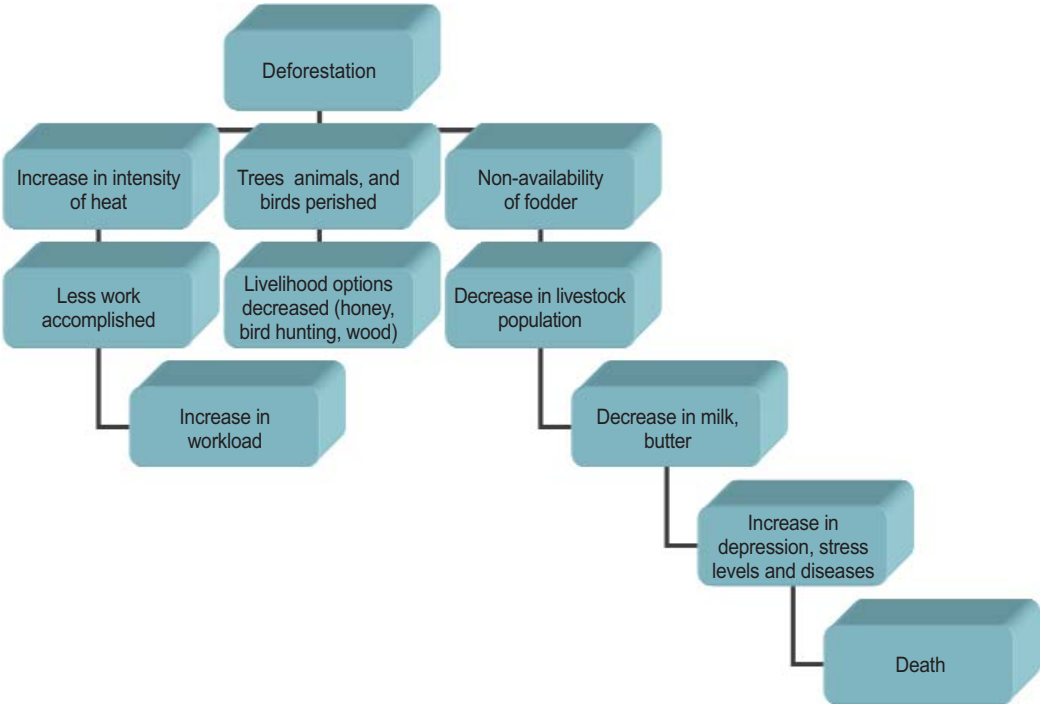
Table 11: Past Natural Disasters or Events Faced According to the FGDs and Decade Matrix from all Villages

Hailstorm 2011	Destroyed wheat crop	Ghandia, Dhang, Meer Mohammad Lako
Flood of 2010	Destructive: caused loss of life and property, and an outbreak of diseases	All selected villages
Flood of 2008	Women were forced to go out in search of work, unemployment increased, people started begging and stealing	Tali Village
Rains in 2001	Houses fell and livestock died	Tali Village
Flood of 1992	Crops, livestock, houses destroyed	Ghandia Village
Flood of 1988 and 1996	Not very destructive	Meer Mohammad Lakho
Hailstorm came 15 years ago (approx. 1995)	A woman died, roofs collapsed	Dhang
Dacoits in the forest 20 years ago (approx. 1990)	Created problems for the villagers, stole their belongings, killed people, didn't let anyone cut trees	Dhang, Ghandia, Meer Mohamamd Lakho
Flood of 1978	Were destructive, people took shelter on roofs and high ground, both animals and people died. People returned after 120 days and it took 2 years to recover	Tali Village

noted that the rise in temperature begins in May and there appears to be no discernible difference between day and night temperatures. A female resident of Tali village mentioned that in the past the summer heat only lasted for 2 hours (1 p.m. to 3 p.m.) after which the breeze was cooler. Conversely, the older female residents in village Tali felt that there was no significant change in the seasons. Winters and summers were normal, with the only problem being caused by the rains; their houses were made of mud so their clothes and food got wet and their livestock had no shelter from the rain. In the past the rains came in accordance with the seasonal pattern for two months, but now heavy and erratic rainfall was creating difficulties for people as well as negatively affecting crops.

The local community was of the opinion that rainfall patterns were more predictable in 1991; the older members of the community noted changes in rainfall patterns occurred in 2001. Now it alternated between dry spells and continuous rain for several days. According to the local analysts the rains now continue for 15-20 days while in the past it only rained for 2 to 3 days. Hailstorms were also a new natural threat as they destroyed everything including crops; fresh in people's minds were the hailstorm and rains of February 2011 which lasted for 36 hours and

Figure 7 (a): Community's Perceptions on the Impact of Deforestation

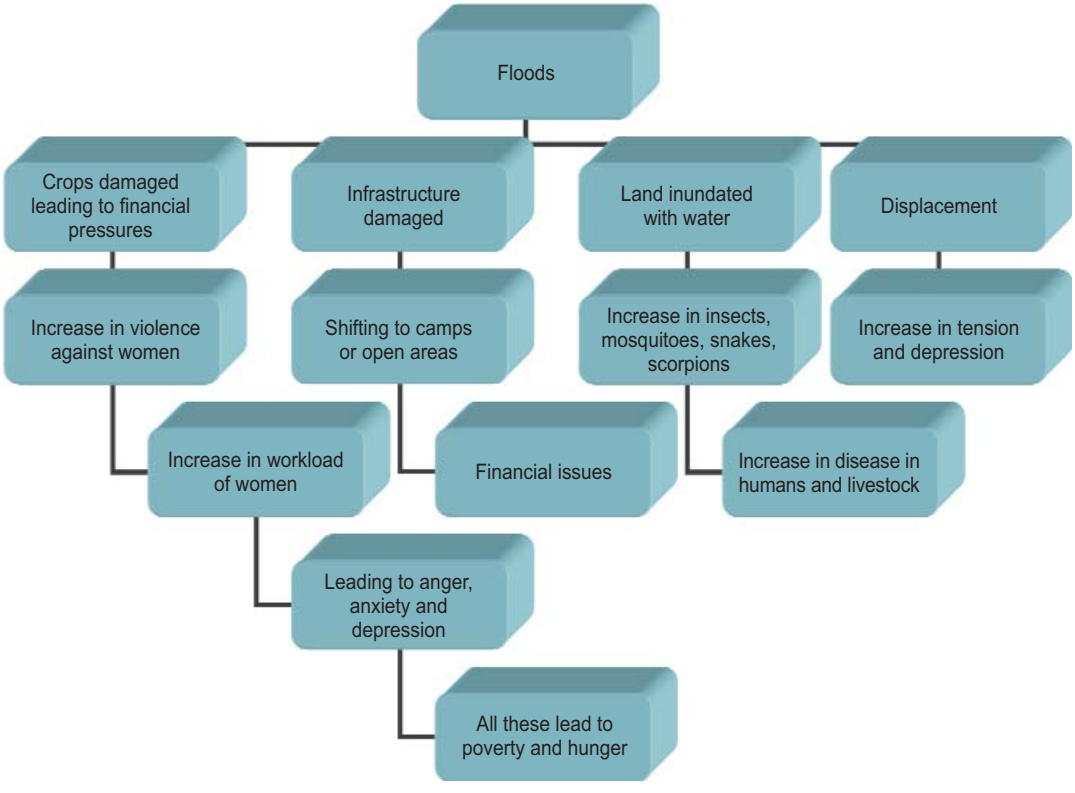


destroyed the crops. The damage was so severe that in one acre 50 maunds of wheat was destroyed. A large number of livestock also perished. The poorest were affected the most and had to go to the city in search of paid labour. The older women in Ghandia reported that in the past wind storms only occurred in the month of April and were of moderate intensity, whereas now they continued for over a month and were destructive.[51] Beginning in the early evening they lasted till 9 p.m. destroying trees and crops, harming livestock and damaging houses.

According to the local analysts the increase in the intensity of summer heat was caused by the clearing of the riverine and Pai forests, the increase in banana cultivation, and an increase in use of pesticides and chemical fertilizers. It was noted that the quality of air has deteriorated - deforestation and excessive use of pesticides are perceived to be the main culprits in the worsening air quality.

Higher temperatures translate into fewer productive daylight hours as well as an increased dependency on electricity. It has become more difficult for women to cook inside the homes; men find escape by going outside. With summers becoming longer winters are now much shorter and last just 2-3 months. However, they are colder and harsher

Figure 7 (b): Community's Perceptions on the Impact of Floods



[51] This is not evident in the District Meteorological data and is a clear indication of how micro-climatic conditions are hidden and overlooked.

Bees saal pehlay ka zamana ziyada acha thaa - hum log kaprhay dhonay kay liye shag par jaatay thay, wahan azadi aur melay ka samaa hota thaa (A female respondent in Ghandia)

Life was good twenty years ago. All the women went to the riverbank to wash clothes. They felt free and there was always an air of festivity.

and the unavailability of wood to burn for warmth has made life more difficult. "The heat is killing the crops," one of the oldest women in the community commented. A lot of the older women felt that the lack of trees had resulted in an increase in diseases. They also mentioned that the number of mosquitoes has increased over time. The locals burn various herbs to repel mosquitoes.

Rains were once considered a blessing as they were not only good for agriculture but also provided a much needed relief from the heat. Now rains were deemed destructive. The excessive and unpredictable rainfall since 2001 has led to water collecting in the fields; this encourages the breeding of mosquitoes and causes pesticides to leach into the water in the fields, consequently resulting in an increase in disease. When children fall ill they have to miss school days. "The unpredictable rainfalls destroy our livelihood," lamented a male resident of village Ghandia.

According to the participants from all four villages floods came after every 2-3 years and were necessary and beneficial. Women from the lowest economic rung in Dhang said they had never experienced rains or floods like the 2010 flood. They were of the opinion that though the 2010 flood was in accordance with the normal climatic pattern, deforestation had hugely increased their magnitude. The well-to-do women said that the floods have made the land infertile and trees will no longer grow; even the neem *(Azhardicta indica)* tree decays after growing to a certain height. The water level in rivers has fallen due to soil deposits making it difficult for water to reach the fields. The villagers have to use lifters and other machines that run on diesel and electricity to get water to the fields resulting in a steep increase in their expenditure. The FGDs, the impact diagram and the decade matrix from Tali reveal that following the flood livelihood patterns have experienced a change: the poor have shifted from farming to daily wage labour and the rich from agriculture to business to earn a living.

3.5 Changing Livelihood Patterns

The rapid degradation of land and ecosystems threatens to undermine food security of local communities. The natural ecosystem of a region provides food and water to sustain the poor and there is high dependency of local communities on natural resources, which traditionally were freely available to all. Rivers, forests, agriculture, fish and livestock were listed as the main natural sources depended upon for food and income. Over the years there has been a steady depletion of natural resources in all four villages. Conversely there has been an increase in the availability of facilities[52] in the area. Land has been illegally possessed by powerful landlords further adding to the deprivation of the poor. Rapidly depleting natural resources, control of available resources by the local elite, and unpredictable

[52] Better transport facilities and establishment of different institutes and government departments.

weather patterns have made it necessary for local communities to adapt and diversify into different occupations. Among the four villages, the residents of Tali have the best livelihood options. The villagers in Ghandia who were originally fishermen are now forced to seek out one of two kinds of labour: either working in chilli, cotton, sugarcane and banana fields, or seeking daily wage labour in Sakrand and other cities.

Agriculture: Agriculture has been one of the main sources of livelihood for the majority of the community. Local agriculture has been adversely affected by abandoning traditional methods in favour of modern innovations that promise immediate and large profit, as well as by climate change. Cropping patterns in all the villages have changed. The promotion of monoculture by landlords, and increase in use of chemical fertilizer has resulted in infertile non-arable land. In addition, the introduction of two-crop system generates more profit and money but for cultivation people now have to take loans. Furthermore, imported seeds have destroyed the crops.

The older women pointed out that traditionally vegetables and grain were grown seasonally. This is no longer the case, for example, onions are now planted in the jowar season. Wheat once took six months to ripen but because of use of chemical fertilizers it was now ready to harvest in five months. Another traditional practice was that only half the land was cultivated while the other half was left fallow. Now all available land is cultivated for increased profitability and to cater to an increase in demand created by a rapidly growing population. The major food crops were bajra and jowar. Wheat and other crops were introduced after the establishment of canal system in the area in early 20th century. Vegetables are not cultivated any longer as they are less profitable. Local farmers have shifted towards cash crops like banana, sugarcane, rice, and wheat production. Before monoculture became common a wide variety of crops were grown, including various local grains and vegetables.

Over the last 20 years rice has replaced wheat and other local grains as a cash crop (it is most profitable). The FGD reports and the seasonal calendar in village Dhang show that in the past cotton, millet, jowar, melon and various vegetable crops were commonly grown. However, during the last five years the local landlord has stopped planting millet and jowar and has focused on the large scale cultivation of commercial crops such as banana and sugarcane. The villagers of Tali reported that banana is cultivated on 75% of the land in Sakrand while other crops (wheat, onion, fodder crops, mustard) are cultivated on the remaining land. Banana cultivation hugely benefits the landlord but this is at the expense of small farmers. Cultivation of banana crop in village Tali has caused water logging making the land permanently unfit for crop production thus adversely affecting the farmers' earnings.

Banana plantation in Village Ghandia

Though cotton and sugarcane are popular cash crops, the most widespread is banana cultivation which is very pesticide-intensive and as a result causes diseases. The earlier traditional practice was to sow half the land with cotton and the other half with wheat and then allow the land to rest for six months. However, the new generation of farmers do not allow the land to recover. Therefore, despite the use of chemical fertilizers the land is not as productive as it used to be. A farmer in Ghandia is known to "rest" his land in the traditional way for six months and the productivity of his land is double that of chemical dependent land (50 maunds of wheat per acre).[53]

Zameenon par kaam hamaray mard kartay thay aur hum un ki madad kia kartay thay. Aik ya do jareeb zameen jo hoti thi us main aik fasal kartay, phir zameen ko araam diya kartay thay. Lekin na ab zameen ko araam hai, na insaan ko. (An elderly woman in Dhang)

Our men used to work on the land and we helped. We used to cultivate one crop in the little land we had and then let it rest. But now neither the land nor the men get any rest.

Grain is the most common food staple as meat is quite expensive. Coriander and green chillies were commonly grown but due to land scarcity this practice has declined. When it is a question of utilising the available land, livestock and fodder take precedence over growing herbs or vegetables. A case study conducted in Ghandia village reveals that in the past vegetables for domestic consumption were grown in homes. Now they have to be purchased from the market adding to the financial burden of the villagers. Some villagers opined that farming was no longer economically feasible for them nor did it contribute towards their wellbeing.

After the 1970s, urea was the most commonly used fertilizer. However, the use of urea leads to groundwater contamination and increases risk of disease. Animal dung, which was a potent fertiliser, is no longer used as farming systems have been mechanized and oxen replaced by tractors for ploughing.

Pesticide Use: According to the community, the paradox of pesticide use is that it has actually resulted in an increase of pest abundance. Some women noted that there were changes in the physical characteristics of the soil; the colour and texture of the soil *(zameen)* has changed for the worse and the 'land has become hot' *(zameen garam ho gayee hai)* as a result of pesticide usage. Women reported that in the past crops emitted a sweet fragrance but since increased use of pesticides, the fragrance as well as their nutritional value has decreased.[54]

The older farmer women in Ghandia narrated how pesticides and new methods of farming have adversely affected the community, both economically and psychologically. They felt that in the long term chemical farming was not beneficial as it made the land barren and produced food

[53] With regard to increase in frequency of crops per land, Khan (2006) also confirmed the increase in the cropping intensity (number of times a parcel of land is cropped in a year) over the last 30 years in Pakistan. The writer also reports a decrease from 2.3 to 0.64 hectares in arable land in Sindh.

[54] Regarding the heavy usage of pesticide in the cotton crops, Anwar et al (2012) confirms the presence of certain pesticide residues in the top layer of cotton crop which can pass on to various plants growing in the same soil.

of low nutritional value. On the other hand traditional farming, in their view, was not only better for the land but also yielded a better crop. The use of chemicals has polluted the soil. As fodder for livestock is heavily treated with pesticides and other chemicals the milk is also contaminated and causes illnesses. The most at risk are those who work in the banana fields as the crop is heavily sprayed with pesticide; 19 out of every 20 people working in banana fields contract hepatitis.

Pesticide-use on the cotton crop is also affecting the health of both men and women. During a case study from village Tali it was reported that earlier the cotton crop was very soft and pest resistant. But now it was hard and vulnerable to the red cotton bug. The locals felt that the community had become dependent on pesticides and fertilizers and often incurred large debts to purchase the products.

Representatives and experts from the Sindh Agriculture Department help the locals with agricultural-related problems and provide them with information. The economically disadvantaged have equal access to this information. The landowners pay for pesticides; the farmers go to the store, explain to the company representatives the kind of pest their crop suffers from and purchase the appropriate pesticides. The Agriculture Department makes regular visits to check for pests and also provides information on pesticides. Though dung compost is occasionally used, nitrate-based chemical fertilizers ones or DAP are more common. According to the community "nitrates are poisonous". Chemical fertilizers are expensive (DAP is purchased at Rs. 4000 per sack) and farmers have halved their use because of the cost. They complained that the fertilizer and pesticide companies do not train them in proper usage and safety precautions thus putting them at risk (boils, rashes, etc. are common).

Riverine Forests: Riverine forests occurred in three of the selected villages (the exception is Tali village which is located near Pai Forest). The forests began to disappear around 2001 when the landlords conspired with the government to cut down trees for agricultural land. The clearing of the forest has adversely impacted the local communities. The older women in Ghandia said the influentials of the area have cut down trees to make way for agricultural land. This has affected the local biodiversity and many plant and animal species have disappeared during their lifetime.

Jab jungle tha ... pakhi (parinday) bohat zyada hotay thay. Mard teetar maar kar laatay thay...jungle main khargosh bhi thay, wo bhi khatay thay. Ab na teetar rahay aur na khargosh aur ab tau jungle bhi khatam ho gya. (A female respondent in Dhang)

There were many birds in the forest. Men used to hunt partridges...there were also rabbits in they forest – these were also eaten. Now there are no partridges, no rabbits, and no forest.

The forests provided a means of livelihood for both the rich and poor. The forests were a source of free wood, herbs, fodder, and honey. Among the middle class it is usually the men who graze the livestock (or arrange for their feed) while in the poorer class this is considered a woman's job. Shortage of grazing land has decreased the number of livestock and increased the workload of women as they take care of the

livestock at home and have to collect fodder. Women from village Meer Mohammad Lakho reported collecting fodder twice a day. The denser forest also helped protect the community from excessive rain, winds and floods; deforestation has made them more vulnerable to disasters. Some of the impacts of deforestation highlighted by the respondents are:

- *Source of livelihood:* The forests were integral to economic security. They provided fuel wood and with the clearing of the forest people have to purchase wood from the market at the price of Rs.200-300 per maund. In the absence of wood from the forest, waste from the cotton plant (stems, etc.) and dung are used. Some also use jheena or small thin branches of khandi or deevi. Even though cutting trees has been banned in Tali village, people still collect wood from Pai Forest. Women sometimes sell the wood. The respondents in village Tali reported that in some areas people earned Rs. 150 for 1.5 maunds of wood and made up to Rs. 500 per day. A concern now is that the availability of Sui gas may affect their livelihood. The wood was not only a quality source of building material but was also used for furniture, for sale as well as for personal use (such as charpoys) and is no longer available to them. The forest was also a source of gum. This was sold and thus another source of livelihood has been lost with the forest.

- *Fodder for livestock:* The forest was used as a free or unsupervised grazing ground saving time and money. Now, the feed for livestock is purchased in the market (by men) or harvested from the fields by women adding to their financial burden as well as workload.

- *Medicinal plants:* Many trees from the forest were used by the locals for treatment of different diseases. Huk, beri *(Ziziphus mauritiana)*, kundi *(Prosopis cineraria)* and bobar *(Acacia Nilotica)* trees were the most commonly used. Most of these trees are now rarely found. The huk tree was used medicinally for problems such as toothaches. Neem was used for skin problems and beri leaves were used to wash the dead. Today, however, people prefer to go to the doctor as opposed to using such traditional cures. Some years ago some locals began to replant neem, beri and bobar trees to attract birds and to be used for fodder. Bobar is a very dense tree and people plant it these days for shade. Bobar and kundi were used for fuel. Tree plantation and maintenance is water-intensive which deters most people from planting them as water is becoming scarcer. Taali, kundi and devi trees are now affected by the mealy bug, an insect that was unknown before and has only been noted recently.

- *Biodiversity:* Different birds and rabbits that were hunted and sold and provided an income for the poor no longer exist due to deforestation. Partridges, parrots and doves were common birds in the forest that were sold and also given as gifts. Rabbits were hunted for meat and kept as pets. The forest was also home to wolves and wild boars. Bird numbers have decreased substantially in the last 20 years and some species are hardly

ever seen. The older women reported that some species have become extinct in their lifetime. The Swamp Deer, which is now extinct, used to shed its antlers every year and these were used for making medicine for kidney ailments, TB and other diseases. Some women said that they have noted changes in bird migration patterns in the last 20 years (those that migrated from Siberia were no longer seen). The birds near the river had nearly disappeared. Others said that pesticide discouraged birds from coming during the wintering period. Birds were responsible for pollinating certain fruit trees (such as Kijji) so this had repercussions for fruit trees as well.

- *Bees:* It was reported that use of pesticides had led to the near disappearance of honey bees, which were important to them as honey was used as a nutritional supplement, especially for pregnant women. Honey was also sold. According to the local analysts the bees died because of lack of water and the use of pesticide on crops. They also said the eucalyptus tree has a poison which kills the bees.

- *Other benefits:* The forests also improved air quality and the lack of trees is related to increased illnesses according to an overwhelming majority in the community. The forest provides shade in hot weather and keeps temperatures down. Fewer trees mean they are more dependent on electricity and gas which though important resources are more expensive.
A few of the older women said that the forest provided shelter to dacoits and the police accused the community of assisting them (if they didn't help the dacoits they would be killed). With the forest gone, they no longer have that problem. Many commented that the forests contributed to their emotional wellbeing and correlated their disappearance with higher stress and blood pressure levels and frequent fits of anger, especially amongst the younger generation.

Indirect Impact: Among some of the indirect results of a combination of development interventions and changes in climate is the reported decline in fish stock that used to be in plenty and could be caught from the river as well as nearby streams. In the villagers' opinion, pollution of river bodies and their drying up are major causes of lack of fish in the river. Fish is only present in certain areas now and used for household consumption. Fishermen in village Meer Mohammad Lakho had been forced to give up fishing and shift to wage labour almost 15 years ago because of the decline in the fish in the river.

Similarly, livestock which is an integral part of rural areas and has a very important role in mitigating poverty has declined in the last 20 years. The local villagers believe goats and buffalos are the community's most important resource (pigeons and chicken are also seen as important). The majority of respondents reported shortage of fodder due to clearing of forests and elimination of free grazing areas has forced locals to reduce the number of their livestock especially buffaloes. The exception is Village Ghandia, where the locals cultivate fodder crops. In the absence of grazing grounds the livestock has to be stall fed with purchased fodder which

adds to the financial pressure on already poor people. Villagers from Tali reported that fodder costs about Rs. 300/maund. At the same time those who still have some livestock reported decrease in milk production from 8-10kg of milk per day in the past in Village Meer Mohammad Lakho, to just 3-4kg milk/day now. To increase milk production, the animals are fed husk and (pesticide contaminated) banana leaves and injected with hormones.

Women are adversely affected by the decrease in livestock as they were dependent on it for both domestic and commercial purposes. Women often inherited land or received it as dowry and lent it to their husbands to cultivate. They also received livestock and would sell the milk and butter. The ensuing income belonged solely to the women and with availability of homemade butter and milk, the women were healthier. Women ate a lot of clarified butter ("ghee") when pregnant. Now milk was mostly sold and not used for household consumption. The added advantage of livestock is that it can be sold when in financial need.

Social Impact: As a result of climate change, the food consumed is less nutritious, water is contaminated, livelihoods are threatened, financial and physical burdens have increased, and violence is on the rise. These factors have reduced emotional wellbeing and increased levels of stress and frustration.

There is less socialization now as women spend most of their time occupied either with household chores or earning a living. About 20 years ago it was traditional practice for women to gather in the fields to wash off pests and eggs from plants. This reduced the need for pesticides and was also a social activity. The women would chat and discuss their troubles. This helped them deal with their problems. The older women also felt that watching television was more common now which also led to reduced interaction. Despite more conveniences and the advent of technology, they felt that the women today were not as happy as their generation.

Villagers now mostly rely on television, radio and cell phones for weather information. However, some older people still use the traditional methods to predict weather (wind direction, use of astronomy or in relation to different seasonal incidents). Some people from Tali village also cited newspapers as a source of information. In Ghandia, the source of weather, climate and disaster information was mostly newspapers and radio, and sometimes television. Women said that elderly people in the community, especially some older women who were trained in traditional ways of predicting seasonal and climatic changes, would tell them what was to come.

Conflict occurs in and between villages. The lower economic classes usually resolve their disputes among themselves before going to more influential members of the community (waderas or landlords) or the local MNA. If, however, the matter was of a serious nature they went to the police or the courts as a last resort. Occasionally there is discord between neighbouring villages but a council of representatives come together for a resolution. Conflicts may be over stolen livestock. The older members noted that conflicts between villages, particularly Dhang and Ghandia, have increased. Landlords tend to get involved (by bribing or influencing the police) and the use of firearms is increasing.

Chapter 4

Impact of Change

Incomes and Livelihoods: Many occupations linked to the forest were all affected by deforestation forcing people to search for other means of livelihood. Some migrated in search of jobs. Those left behind turned to labour and working in the fields. People now work as masons, carpenters, etc. and go to cities such as Hyderabad and Karachi in search of work. Others work on banana and sugarcane plantations and in cotton fields. The poor face food insecurities and livelihood threats. In the eventuality of crops getting destroyed they do not have the means to start a new business and no one is willing to grant them a loan. The families of men who have jobs are relatively stable and settled. Where men are employed as daily wage labourers the women have to bear the expenses on the days the men fail to find work. Most men work in the village while just a few work in factories in cities. The villagers from Tali report an increase in crime rates and murders and attribute this to the lack of livelihood opportunities.

Change in Behaviour: Locals felt that increased temperatures and unpredictable weather has made men and women tetchy. Anger and frustration has increased and domestic conflicts and violence have become more common. Unemployed men vent their frustration by hitting women. The older women said that marital conflict and violence against women has definitely increased in the last two generations. In the past domestic matters were resolved by the elders of the family but now people were impatient and hot-blooded. Group discussions with women from a well-off economic background in village Tali revealed that the *kari* women (rich) were physically assaulted by their men whenever the men

suffered an economic loss. The women tried not to give them a cause to be angry. Furthermore, women from well-off economic background faced restricted mobility, especially in comparison to other economic classes. In village Dhang, it was found that among the poor the cycle of violence caused by an increase in anger in both men and women resulted in men beating women, and women beating

Cotton crop destroyed by monsoon rains, 2011 (Village Tali)

children. In some instances women also hit their husbands. Most of women's arguments with men were over financial problems. In extreme situations women resorted to attempting suicide by drinking pesticides. Women and men in Dhang and Meer Mohammad Lakho reported an increase in drug abuse and also in the rate of suicide. Stress-related illnesses are on the rise. These are aggravated by changing habits, such as preference of smoking cigarettes to hookahs and drinking more tea whereas earlier jowar and millet soup was eaten. It was believed that the changes in eating habits as well the quality of food affected people making them more volatile. It was found that men became more aggressive and sexually violent during times of natural disaster.

Health: Changes incurred by development interventions, climate and livelihood patterns have adversely impacted people's health. Increased temperatures have made household chores and livestock rearing more difficult. There has been an increase in diseases in women especially those working in the fields and belonging to poor families.

In the local people's perception the two main culprits were the pesticides used in banana plantations and deforestation. Women working on these plantations face more health problems than ever before as the result of being exposed to pesticides and pesticide runoff. Skin diseases (skin peeling off, itching, etc.), diarrhoea and respiratory problems were the most commonly reported ailments followed by hepatitis. Deforestation has led to air pollution which has contributed to respiratory illnesses. Burning plastic bags, which were a rarity a few years ago, releases toxic fumes which also cause respiratory diseases. Using dung cakes and cotton stalks for fuel is also a cause of respiratory and eye problems. Women from Meer Mohammad Lakho reported suffering from breathing problems in summers. The high concentration of waste due to the close confinement and overcrowding of livestock has led to an increase of foul odours. A lack of plants that would normally help eliminate the odours makes the environment more untenable. It also provides a breeding ground for disease vectors such as mosquitoes and flies. Many report high

blood pressure as a common complaint, which was rare 20 years ago. Grass fed to the animals has pesticides and fertilizers in it. Buffalo milk is similarly contaminated. Consuming meat and milk means the community is ingesting disease-causing chemicals. The older women mentioned that traditional cures were no longer used. People went to the doctors in the city. Traditionally, berries from the forest mixed with neem and ground with *misri* (crystallised refined sugar), and *Gwara ki phalli* (cluster beans) were used to fight fevers and infections. Some women and men reported that infant mortality had increased substantially in recent years and that most of the women who lost children worked on banana plantations. A case study conducted in village Tali also highlights the correlation between use of pesticide in crops and increased diseases in women. Pregnant women working in cotton fields were putting their unborn child at risk. The older women revealed that pregnant women used abortion as a means of contraception during the cotton picking season because it was the time of maximum earning and they would not be able to work if pregnant. Caesarean births are common now, as more and more women face complications during pregnancies.

Hum apni zameenon main faslon ke saath jo faaltu jari bootian hoti theen, wo nahi nikaltay thay...in say hum apne bachon ka ilaaj kartay thay (An elderly woman in Dhang)

We never destroyed the wilds herbs that grew along with the crop...we used them to treat our children.

The rains, lightning and floods have instilled fear in some women who have developed heart problems. Having to do more embroidery work to earn a living has adversely affected their eyesight. Women from village Tali mentioned that every winter 4 to 5 women between the ages of 35 and 60 experience attacks of paralysis.

The older women participants were of the view that women today looked older than their age. They suffered from hepatitis, blood pressure, anaemia, skin diseases, backaches, leg aches, headaches and lethargy.

Impotence in men was reportedly becoming more common. Smoking has become widespread and fewer and fewer people used the traditional hookah. The community correlated this to increased respiratory diseases amongst them. The warmer climate, in their view, increases incidence of hepatitis and jaundice. Frustration caused by a decrease in means of livelihood has led to an increase in the consumption of alcohol by young boys of Meer Mohammad Lakho leading to health problems.

Water: Women used the canal *(nehr)* and tube well to collect water before taps were introduced about 40 years ago. The canal is still used as a source of drinking water for the livestock. Before taps became commonplace in the village (about two decades ago) women used to walk far to fetch water. The older women said that going to the wells was common, increased their mobility and was not a burden but rather a social activity that provided women the space and opportunity to discuss their personal problems and the problems of the village as well as organize themselves. The older women from village Ghandia reported a change in taste of water: it was now bitter

while in the past it was sweet and because of this people now drank less water. Approximately 68 feet deep wells are dug for drinking water. They related the decline in water quality to the change in rainfall patterns over 20 years and to the use of pesticides. Stagnant flood water adds to the pollution. Water has become contaminated by arsenic.

In earlier days water from the well was used to irrigate crops but now water from tube wells is used. As petrol is used to run tube wells, the production cost incurred by the farmer has increased. Drip irrigation has been introduced by the landlords but this technology is too expensive for the community.

Table 12: Past and Present Conditions and their Impact

Past scenario	Present condition	Impact
Rains according to season	Abrupt rains	Flooding, loss of life (humans, livestock) and property (houses, crops) leading to poverty.
Cultivated onion, cotton, wheat, millet	Introduction of banana crop in Tali village and sugarcane in Dhang village because of huge profit from these crops.	Resulting in disease, increased use of pesticide, waterlogged land.
Used natural fertilizer	Increased use of chemical fertilizer and pesticide	Creating disease in both humans and livestock, reducing nutrient value of crops. Increase in pesticide usage has killed birds, affected trees such as beri and neem which have become dry and negatively impacted human life socially.
Livelihood and resources linked to forest	Forest cleared for agricultural land	Wood, honey, natural fodder, birds and animals finished. No clean and cool air from the forest. Increase in intensity of heat, decrease in livestock population.
Utilized water from river and income generation from fish catch	Decrease in river water and increase in water pollution	Decrease in fish catch affecting livelihood. Increase in skin disease because of polluted water.
Livestock grazed in forest	Now stall fed, kept at home as no grazing ground	Increased cost of purchasing fodder, increased workload of women. Decrease household use of milk and butter by women affecting their health.
Summers cooler	Increase in intensity of summer heat	Women able to do less work, increasing anger and frustration, affecting income generation.

4.1 Women's Changing Roles and Responsibilites

Natural disasters have affected the daily routines, behaviours, diet and nutrition of women. Women reported impact of various changes: climate, clearing of forest for agriculture leading to changes in cropping patterns, etc. The intensity of weather due to changes in climate has added to women's work load. Household chores have increased and situations like the floods have been a challenge. Additionally, women have to look for alternate sources of work for income generation. All these factors have a negative impact on women from all age groups.

Regarding the effect of climate change on women's workload the older women said that in the past women rose early in the morning, ground flour and completed their household chores, after which they went to the well together for water. It was easier to adapt to the seasons in the past; the extremes in weather have now made it difficult. The intense summer heat and the lack of proper nutrition due to a poor diet have made it difficult for women to go about their normal household chores in the summer. Women have to face the additional problem of cooking and heating during the rainy season as fuel wood is rendered wet or damp by the rain.

The older men felt that women were not paid fairly for their agricultural work and that they worked harder than men. "Women are treated like animals when it comes to work," one man said, referring to the landlords. "The women's work is worth 12 *anay*[55] and the men's work is worth 4 anay and despite this they are paid nothing. On top of all this, they do all the housework. The truth is that women work more than men," said an elderly man from Ghandia.

Table 13: Issues Linked to Women as a Result of Climate Change

Issue	Solution	Restrictions	People's interventions
Difficult to work in hot weather	Trees should be planted	Poverty, inefficiency of the forestry department, economic instability.	Try not to work under the sun, look for other means of livelihood.
Increase in diseases in women such as hepatitis, blood pressure, depression, diabetes.	Camps should be organized in the villages and awareness sessions and courses on hepatitis held	Lack of information, inaccessibility to organizations, poverty, no support from government hospitals.	Those who can afford it go to private hospitals
Problem during deliveries, sometimes resulting in deaths.	Medical health camps, training of lady health workers.		Adopting local methods, taking medication from government hospitals.
Increase in workload	Provide other means of livelihood	Lack of willingness by government authorities	Have no other option, adjusting to the changing condition.

[55] Equal to current 75 paisas.

Chapter 5

Adaptation Strategies

In case of natural disasters people resort to different means to cope with the situation. The older women in Ghandia said that over 20 years ago natural disasters were considered rare events. They remembered a flood from 19 years ago. To cope jowar and lucerne was stored (lucerne is a type of fodder for livestock) and livestock were taken to a safer place. Families moved to the neighbouring village, which was less affected, till the water receded. To cope financially, women took up embroidery and *ralli* making to sell. This is where the current trend of taking up *ralli* and embroidery as an alternative livelihood originated. The older women said that they used to save money for emergencies.

In case of floods, rains, winds, and storms they preserved grains, baked bricks, made roofs strong, and moved families and livestock to safer areas. In village Dhang it was seen that in such situations the richer community members rented homes elsewhere and moved out and also moved their livestock to dry areas while the poor were left behind. During a flood situation anyone who has access to a car or can rent a vehicle takes as many people and belongings with them as they can to the nearest town or least affected village. Those with more resources are able to rent houses in the city (such as the more well-off members of the community) till the water recedes. The older women reported that the older members of the community that are left behind in disasters are the most vulnerable.

The poor in Ghandia said some trees have recently been planted by the local MNA to deal with the increased temperatures. However, they cannot plant trees on the land

Table 14: Merits and Demerits of Two Natural Disasters According to the Decade Matrix and FGDs

Disasters	Merits	Demerits	Adaptation strategies
Floods	Increase in fish after receding of flood water, increase in land fertility, increase in crop yield, increase in fodder and livestock, decrease in crop disease.	Damage to crops, infrastructure, livestock, people, decrease in livelihood means, decrease in fodder during floods, increase in diseases, food shortage, increase in mosquitoes and snakes, increase in poverty and migration. Livestock is sold and women have to work more.	Build houses on higher ground. Preserve grains. Shift families and livestock to safer areas. Save money for difficult times. Sell livestock.
Winds/storm		Injuries, loss of trees and animals, crops damaged, houses damaged, increase in diseases. Forced to take loan resulting in economic pressure leading to increase in violence, poverty and depression.	Preserve grains, shift families and livestock to safer areas.

themselves without his permission since the land does not belong to them. However, awareness about the importance of trees is growing and people are beginning to plant trees at home when they can. Television and stories of tree plantation in neighbouring villages have also increased awareness and encouraged people to plant trees in the village. They deduced that if more trees were planted it would reduce the impact of floods. Occasionally, the government gives out free saplings for them to plant during the planting season but they need more education, training and permission to do more.

To cope with unpredictable rainfall the community stores food for themselves and their livestock inside their homes, as well as fuel wood and warm clothes. The farmers try and finish as much work as possible before the rains. It takes about 3-4 months for the fields to recover from the floods so that the crop can be planted again, the women farmers reported. To cope with this, they harvested the crop just before the rains came so they could still store enough for themselves and to sell.

To cope with the hot summers, they bathe more to cool down, drink lemonade (for its cooling properties) and try and stay indoors as much as possible. The community reported that the forests served to absorb storm water/excessive rainfall and also served as reservoirs of water. Some of the area around the village has been developed with concrete thus preventing the absorption of rain water into the ground.

The economically disadvantaged group especially, felt that education was very valuable and would increase their capacity to deal with and adapt to disaster and climatic changes. However, education would not necessarily increase economic prospects. According to most members of the community, the value of education lay in helping them to conserve and manage their natural resources more sustainably, especially for the next generation. This was an interesting and profound aspect of education that the community discussed in light of their observation that resources were decreasing day by day and they needed to conserve them for their future generations.

Table 15: Decade Matrix on Changes over the Past Two Decades in all the Selected Villages

	Dhang		Ghandia		Tali		Meer Mohammad Lakho	
	1990-2000	2001-2010	1990-2000	2001-2010	1990-2000	2001-2010	1990-2000	2001-2010
Rains	2 (frequency more but blessing)	4 (frequency varied)	5 (more but were beneficial)	4 (less but destructive)	5 (fast but not destructive)	3 (less and destructive)	2	2
Livestock	Population more	Less	5 (was less)	2 (increased)			13 (less)	9 (increased)
Forest/grazing land/trees	Had forest	Cleared	5 (beneficial)	0 (no forest)	5 (more)	2 (decreased)		
Floods	0 (less but beneficial)	5 (more and destructive)	3 (flood was destructive)	1 (no flood)			5 (blessing)	2 (destructive)
Crops	4 (more profit)	3 (less profit)	4 (never took loans)	5 (earn more)	5 (more profit)	2 (less profit)	5	4
Earthquake	0 (no earthquake)	3 (now earthquakes are terrifying)	5 (less)	4 (more)				
Wood	5 (had wood)	2 (decreased)			5 (more)	2 (less)		
Winds			2 (not destructive)	5 (destructive)				
Diseases			2 (less)	4 (more)	5 (less)	2 (increased)		
Winters			2 (bearable)	4 (unbearable)	5 (bearable)	2 (unbearable)		
Transport			1 (condition bad)	2 (slightly improved)				
Pollution			5 (less)	0 (increased)				
Water					5	4 (polluted)		
Summers			2 (was bearable)	5 (not bearable)	3 (less)	1 (increased)	3	5
Birds					5 (more)	2 (population decreased)		
Population					5 (were happy/ content)	2 (depressed and angry)		

Note: The respondents scored on a scale of 1-5 for change being positive or negative, decrease or increase, beneficial or harmful.

Interestingly, many saw value in educating women, mentioning that this will help them adapt better to decreasing resources and climatic unpredictability.

It was noted that the community was close knit and had thought about preparing for disasters amongst themselves and worked together (as they described their experiences from the 2010 flood and the hailstorm in February 2011). Livestock are kept in sheds built at a higher level to keep them safe. A large metal chest was used to store warm clothing and food for themselves and their livestock. Lanterns and gas cylinders are used and their supplies stored for fuel and warmth. Some people had raised the level of the ground around their homes to prevent water from entering their homes. During the recent flood, women labourers and men worked together to pile sandbags around the river and the dam so as to control the overflowing of the storm water. The river banks need to be reinforced and this will make them far less vulnerable to the floods and excessive storm water. Women looked after the possessions in the home and kept them packed in case they had to leave. Another strategy employed was to strengthen the roofs of their houses so they did not leak. Women said there was little medical help available to them during disasters. There were some LHWs but no doctors. The LHWs cannot really help except for administering vaccines. It was strongly felt that the Government should do more to help transport people to safer places and improve the infrastructure.

Chapter 6

Post Flood Assessment

Given that the heavy rain and flood followed immediately after the study in 2011, the research team was able to facilitate assessment of flood affects in the study villages.[56] Local villagers also compared the damage in the flood of 2010 with that of 2011. In 2010, a total of 4,972 houses were damaged in District Shaheed Benazirabad, and Guhram Mari was the worst affected UC in Taluka Sakrand.[57]

According to local respondents, in the 2010 flood the groundwater level had risen from 100 feet before the flood to 40 feet after it. The flood deposited a lot of soil on the fields, raising it above the level of the

Table 16: Damage Assessment of Sakrand during the 2010 Flood

Taluka	Affected Population	Affected Area (acres)	No. of Affected UCs	No. of Camps	Population in Camps	No. of Damaged Houses	No. of Damaged BHUs	No. of Damaged Schools
Sakrand	23439 (DCO)	67767	05	0	0	2275	0	22

Source: Provincial Disaster Management Authority[58]

[56] Shirkat Gah provided relief to people in the study villages as well as to two nearby ones as they were not in the loop of official relief efforts. A total of 370 households were provided relief and given a month's ration. After the relief distribution activity, the livelihood research team documented the post-flood/rain situation of the four villages (Ghandia, Dhang, Tali, Meer Mohammad Lakho) under study.

[57] This is based on the mapping done by Shirkat Gah.

[58] http://www.pdma.pk/dn/

canal and pathways. Electric or diesel pumps have to be used to pump up the water for the crops and the women helped with this. The main crops that were destroyed were rice and wheat. Many people in the community helped each other out financially and loaned each other money.

In 2011, the rains started in July creating havoc in the Sindh province and increasing the miseries of the people who had not recovered from the 2010 flood. Breaches in the canal linked to Left Bank Outfall Drain (LBOD) resulted in inundation of a vast area of land. The district received 613 mm of rainfall from July to September 2011 affecting approximately 290,000 acres area of crops and displacing 57,687 people. The National Disaster Management Authority (NDMA) reported 51% women and 49% males affected during the flood of 2011. In Taluka Sakrand 610 villages in its 12 UCs and about 51% of the population of Sakrand Tehsil were affected. Reportedly 13 people died, two of who were women, and 4881 cattle were lost. There were 13 relief camps set housing 710 people (156 women and 384 children).[59] By October they had all returned to their homes.

Like the flood of the previous year, the 2011 flood also caused destruction of crops, livestock and homes. Sakrand had many fish ponds which were destroyed at a loss of 2.5 lakh rupees. Poor people slipped further into poverty. Women and children were the most affected. Describing the rains of 2011 the locals - even the oldest members of the community - said that they had never witnessed such rains before. The heavy rains started in August and lasted from one month (Dhang) up to three months (Tali). Many homes were completely destroyed, while the walls and roofs of many more were severely damaged. With increase in the intensity of rains people moved into open areas as they were frightened that their houses would fall. They wrapped themselves in plastic and sat under the open sky. Those whose houses were destroyed took shelter in others homes. Some used tents but these were not very effective. Others took shelter in government schools and hospitals.

Table 17: Damage Assessment of Crops in District Shaheed Benazirabad during the 2011 Flood.

Crop	Damage to autumn crops 2011 (Sindh)			
	Area	Yield	Factor	Production
	000 ha	Kg/ha	Damage	000 tons
Cotton	37.1	1060	0.8	185.2
Chillies	0.05	4000	0.5	0.10
Onion	6.8	14603	0.9	89.4
Tomato	0.16	7063	0.9	1.02
Rice	0.8	3188	1	2.5

Source: FAO and SUPARCO[60]

Water entered homes as the villages were at a lower level than the fields. Villagers had to rent machines at exorbitant prices (ranging from Rs. 50,000-100,000) to pump rainwater out of their homes into the canal. They pooled their money collecting Rs. 1,000 per household.

People were unable to cook food as the wood was damp. They subsisted on water for many days which resulted in stomach

[59] Rehabilitation Department, Provincial Disaster Management Authority, Government of Sindh. Retrieved from <http://pdma.pk>.

[60] Pakistan Rain/Flood 2011. Report on Flash floods, breaches in canals and damage to infrastructure and agriculture sectors in Sind Province, FAO and SUPARCO. Retrieved from <http://suparco.gov.pk>.

problems among the children. They eventually burnt whatever material was available (old shoes, clothes, furniture, etc.) to light a fire to cook. The government had sent some food items but these were insufficient.

Trees fell, crops were destroyed and livestock perished. Water levels rose to up to five feet inundating the land and destroying the rice and banana crops. The floods destroyed 90% of the crops including cotton, sugarcane, onion and chilli. It would take at least 3-4 months for the water to recede. Therefore, the villagers feared they would be unable to sow wheat in the months of November and December, nor grow winter vegetables, pushing them into further poverty. In Tali, four hundred acres of land planted with cotton would have generated a total revenue of 6 crore rupees. This was destroyed during the rains and ensuing flood. The rains led to an increase in the mealy bug population. The pest severely infected and effectively destroyed the cotton crop and resulted in a loss of livelihood for the local women.

A large population of livestock perished. Animals were moved to dry embankments for safety. There was an increase in mosquitoes causing diseases in human beings and animals; other than infections animals also suffered from maggots and stomach worms. While affected livestock were given medicine by the veterinarian, most villagers could not afford the prescribed daily injection which would cost Rs. 8000 for a month's treatment. To add to the misery of villagers, livestock was also stolen.

Local landowners and influentials had insect repellents sprayed around their own land and homes, but not the homes of the villagers. Malaria, cold, fever, skin diseases and typhoid were on the rise. Diarrhoea was common. Numbers of snakes and scorpions had also increased.

Groundwater was polluted and unfit for drinking. Children and pregnant women were most affected. As the women had no source of income they were unable to get medical aid for their children or themselves.

Despite the extreme levels of destruction, official help was missing. Nothing was done by the government to replace livestock neither were medical camps established in the area. The people whose homes were destroyed had no money to rebuild their homes and had to take loans. Some were still living without shelter or with relatives.

The government introduced Watan Cards[61] to assist flood affectees. Funds from the Benazir Income Support Programme (BISP) were also allocated for this purpose. However, there were gaps in implementation of schemes. Villagers were asked to pay (Rs1000-2000) for the Watan Cards. Locals in Ghandia who paid had still not received them[62]; those unable to pay the bribe do not even have the hope of benefiting from the scheme. In Dhang, some villagers did receive Watan cards after paying Rs. 1000. In Meer Mohammad Lakho people had to pay Rs. 1000 rupees to get money through Benazir Income Support Programme.

[61] The Watan Card Scheme was established by the Government to compensate flood affected people for damages suffered as a result of the disaster that hit the country.

[62] This was the status in October 2011.

During the flood women toiled at salvaging household items. They took care of the children and tended to the sick members of the family. They worked alongside men in building embankments to protect their homes, villages, and fields. The financial pressure on women increases during and after natural disasters. Labour is difficult to find as a consequence of which the earnings of the families decreases. To cope, women work in fields plucking cotton, harvesting wheat and cultivating vegetables alongside men. Women also cut grass for livestock, something they never did earlier. Women also make alcohol at home to sell. The economically disadvantaged community members mentioned that the poorer women have to resort to begging and that their husbands are not the main breadwinners in most cases. The poorest women are those whose husbands do not work and the family has to survive on the woman's income alone.

After the flood, men worked in sugarcane fields making Rs. 125 per day. They also harvested the remaining rice. Because of lack of income sources, men took care of other people's livestock at half the going rate and searched for daily wage labour in neighbouring villages. Women working in fields lost their source of income as fields were inundated with water. They were therefore focused on re-making their houses. They have started *ralli* making, stitching and embroidery to generate some income as an alternative means of livelihood. Women in group discussions in Ghandia reported that fearing loss of income they continued embroidery work even while in camps. After the flood, women went to other villages to harvest cotton for which they earned Rs. 450 for 15 days of work. The rains have increased their problems and hardships. Those in debt were in even more financially constrained after the flood as they did not have the resources to pay off their loans and were in fact forced to borrow more. Weddings in the villages are usually held after the harvest as the villagers have made an earning with the harvest. No weddings will take place this year as no crop has been harvested.

Problems faced during the 2011 floods in all the selected villages:

- No help from government
- Increase in population of mosquitoes, snakes and scorpions
- Increase in diseases and deaths of livestock
- Diarrhoea common among children
- Medical treatment is expensive
- Lack of employment opportunities; forced to go to other villages for labour
- Women have to work in cotton fields inundated with water
- Harassment issues in camps
- Forced to pay extra for services such as pumping water and Watan cards.
- Increase in mosquito population during floods resulting in an outbreak of malaria.

Chapter 7

Conclusion

The study clearly shows that *one,* climate change is a critical exacerbating factor for people's livelihoods due to the unpredictability it brings to weather patterns and the accompanying intensity that puts people under severe pressure. *Two,* the extent of impact is directly correlated to the socio-economic status of the population especially of women within. Those better off (the local elite) who control available resources are relatively less affected by both, man-made interventions or weather vagaries. *Three,* notwithstanding the inherent resilience of local communities their coping mechanisms are inadequate to confront the multiple challenges of shifting development paradigm and the onslaught of climate induced disasters. As a result achieving well-being is elusive.[63]

The four villages tell a story of developments/interventions over two decades that have led to major displacement of people and occupations. Riverine forests were cleared for banana plantations and with them grasses, fuel, medicinal plants, honey, grazing lands, etc. disappeared[64]; wetlands diminished and with them the fish stocks -- fishing communities were forced to take up seasonal wage labour in chilli, cotton, sugarcane and banana fields, or seek daily wage labour in Sakrand and other urban areas; agricultural patterns changed with the shift to cash crops, use of chemical inputs and mechanisation; as availability of fuel and fodder decreased so did the number of

[63] End of poverty, better health, healthy food, education and occupational opportunities, less conflict, among other indicators.
[64] And also dacoits, they admitted.

livestock. The result has been adverse on income, health (hepatitis, skin infections, malaria) and the social fabric (hypertension, conflict, increased domestic violence, drug use, attempted suicides by women). There has been a shift from reliance on traditional medicines and herbs to modern medicine for healthcare which adds to the cash burden of households. Women's reproductive health needs however continue to be met by traditional birth attendants while preventive and emergency medical care remains inaccessible.

Local communities are known for their resilience and their capacity to cope with changes. In the villages of Shaheed Benazirabad local analysts, both men and women shared how they have faced the changes in order to fulfil their livelihood needs. However, their coping mechanisms are limited by available options. With little education and equipped only with traditional skills they are found to be unprepared for changes that require new skill sets and do not have the wherewithal to pursue or acquire them. Confronted with the challenge of sheer survival the majority of the poor, landless or small landholders of the four villages rely on their physical labour to meet their livelihood needs.

The burden on women has multiplied especially with the need for cash incomes whereas change in educational, information and skills level has been minimal. Where in the past women relied on natural resources for their domestic and reproductive roles with livestock and dairy products providing nutrition as well as an income cushion, they now are compelled to sell the milk from dwindling livestock and have to look for alternate sources of work to bear household expenses on days that men fail to find work. Vegetables that could be procured free of cost now have to be bought from the market as, where possible, local farmers would rather grow fodder. While large scale cotton production provides the cotton-picking option for income to women, extensive pesticide use has detrimental effect on their health, as does the use of dried and contaminated cotton stalks as fuel in the absence of wood. Among other income generating opportunities are the traditional skills of embroidery and *ralli* making and very atypically, some women making alcohol for the family's survival. Given prevailing gender norms women's work is not given equal value and receives lesser remuneration. As an old man from village Ghandia put it, "women's work is worth 12 anay (equal to current 75 paisas)…the truth is that women work more than men." Some women also said that their work was not recognized or appreciated and through watching TV they have realised that women too have the right to express their ideas.

Local people reported changes in micro-climate (increased intensity of heat in summers, stronger windstorms)[65] with implications on working hours in a day, but it was the unprecedented heavy rains and floods in 2010 and 2011 that brought home recognition of extreme weather change. Administrative unpreparedness and poor infrastructure deepened the vulnerability of the poor in the two devastating natural disasters. Women found themselves more at risk and unprepared when the floods struck. It is interesting that villagers in all four

[65] The Met department reported heat index increasing to 66.0°C in May and 68.7°C in June.

villages now report developing contingency measures to deal with emergency situations. To cope with unpredictable rainfall the community has decided to store food for them and their livestock inside their homes; farmers said they would try and finish as much work as possible before the rains. They have also identified buildings on higher ground for moving away if another flood occurs.

The research indicates that an integrated approach is required to address the issue of climate change. Major displacement -- physical, occupational, nutritional that is occurring whether through development interventions and multiplied by climate change -- requires new solutions to match the nature of change and most importantly to create opportunities for local people towards sustainable livelihoods.

During the research it was observed that all communities, and both women and men, are eager to try and find solutions indicating that they can be effectively mobilised. However, there are initiatives that fall under the purview of the district and provincial government. For example, the negative effects of earlier "misplaced" development interventions like cutting the riverine forest, or excessive use of pesticides can only be addressed at the policy level. Some of the interventions cannot be reversed but their impact may be reduced through mitigation measures.

Similarly infrastructural maintenance e.g. of embankments and dredging of canals is a preventive intervention for which the responsibility should be of district government and local communities can also be mobilised for this.

Early warning system for impending weather related through radio or TV can be institutionalised (it already is in place but does not always reach out to remote areas) for timely alerts.

For men and women, the landless, marginal farmers and others without assets, to expect self -propelled adaptation is unrealistic as it may enable survival but not well-being.[66] Recommended measures for them include:

- Special adaptation fund for grassroots communities to prepare as well as respond to changes impacting their livelihoods.
- Inclusion of women in all decisions related to natural resources, their use, management and regeneration. Restoration of local government system with 33% seats for women is therefore an imperative; develop female leaders with knowledge of rights and qualities of mobilisation and taking collective action.
- Creation of women owned and managed assets like the land allocation scheme of Government of Sindh backed up with green technologies (drought resistant crops, water conservation/ management system, fodder) to ensure household food security; up scaling the Waseela-e-Haq Scheme

[66] Health, education, food security, among others.

whereby women entrepreneurship is enhanced.

- Ensuring more conventional schemes for girls for promotion of secondary and high school education, reproductive health services including family planning services with follow up; linking local craft products to market needs; training women in marketing skills, etc.

- Promotion and adaptation of crops according to climatic condition (drought and frost resistant crops and efficient irrigation system to cope with water shortage).

- Measures adopted and promoted for reducing degradation of natural resources.

Annexures

Details of Focus Group Discussions

Village	Date	Team	Total participants
Dhang	13.07.2011	Female	16
Dhang	15.07.2011	Female	14
Dhang	15.07.2011	Male	10
Ghandia	15.07.2011	Male	15
Dhang	15.07.2011	Male	12
Dhang	16.07.2011	Female	15
Dhang	16.07.2011	Male	More than 30
Dhang	16.07.2011	Male	More than 25
Ghandia	16.07.2011	Female	15
Ghandia	16.07.2011	Female	15
Ghandia	16.07.2011	Male	8
Dhang	17.07.2011	Female	15

Details of Focus Group Discussions

Village	Date	Team	Total participants
Ghandia	17.07.2011	Male	12
Ghandia	17.07.2011	Male	7
Ghandia	17.07.2011	Female	10
Ghandia	17.07.2011	Female	16
Dhang	18.07.2011	Female	8
Dhang	18.07.2011	Female	18
Dhang	18.07.2011	Female	9
Dhang	18.07.2011	Female	11
Ghandia	18.07.2011	Female	19
Ghandia	18.07.2011	Male	10
Ghandia	18.07.2011	Male	8
Ghandia	18.07.2011	Female	10
Dhang	19.07.2011	Female	12
Ghandia	19.07.2011	Male	8
Ghandia	19.07.2011	Female	10
Ghandia	19.07.2011	Female	12
Meer Mohammad Lakho	26.07.2011	Male	14
Meer Mohammad Lakho	26.07.2011	Male	13
Meer Mohammad Lakho	28.07.2011	Male	13
Tali	28.07.2011	Female	13
Tali	28.07.2011	Female	20
Meer Mohammad Lakho	28.07.2011	Female	14
Meer Mohammad Lakho	28.07.2011	Male	12
Meer Mohammad Lakho	29.07.2011	Male	17
Meer Mohammad Lakho	29.07.2011	Female	19
Meer Mohammad Lakho	29.07.2011	Female	14
Meer Mohammad Lakho	29.07.2011	Female	20
Meer Mohammad Lakho	30.07.2011	Female	14
Meer Mohammad Lakho	30.07.2011	Male	12

Details of Focus Group Discussions

Village	Date	Team	Total participants
Meer Mohammad Lakho	30.07.2011	Male	10
Meer Mohammad Lakho	30.07.2011	Female	11
Tali	31.07.2011	Female	20
Tali	31.07.2011	Male	8
Tali	31.07.2011	Male	9
Meer Mohammad Lakho	31.07.2011	Female	13
Meer Mohammad Lakho	31.07.2011	Female	15
Meer Mohammad Lakho	31.07.2011	Female	15
Meer Mohammad Lakho	31.07.2011	Male	11
Tali	01.08.2011	Female	20
Tali	01.08.2011	Female	12
Tali	01.08.2011	Male	8
Tali	01.08.2011	Male	8
Tali	02.08.2011	Male	8
Tali	02.08.2011	Male	9
Tali	02.08.2011	Female	14
Dhang		Male	15
Dhang		Male	12
Dhang		Male	6
Dhang		Male	15

Details of Participatory Rural Appraisal Tools

	Village	Date	Team	Total participants
Seasonal Calendar	Dhang	12.07.2011	Male	14
	Ghandia	15.07.2011	Female	20
	Ghandia	16.07.2011	Male	14
	Dhang	16.07.2011	Female	20
	Meer Mohammad Lakho	27.07.2011	Female	20
	Meer Mohammad Lakho	27.07.2011	Male	14
	Tali	30.07.2011	Female	48
	Tali	30.07.2011	Male	13
Venn Diagram	Dhang	14.07.2011	Male	17
	Ghandia	15.07.2011	Male	18
	Ghandia	15.07.2011	Female	21
	Dhang	16.07.2011	Female	13
	Meer Mohammad Lakho	27.07.2011	Male	14
	Meer Mohammad Lakho	28.07.2011	Female	21
	Tali	29.07.2011	Male	13
	Tali	31.07.2011	Female	21
Well Being Ranking	Ghandia	12.07.2011	Male	12
	Dhang	12.07.2011	Female	14
	Ghandia	12.07.2011	Female	20
	Dhang	14.07.2011	Male	16
	Meer Mohammad Lakho	25.07.2011	Male	14
	Meer Mohammad Lakho	25.07.2011	Female	20
	Tali	27.07.2011	Female	25
	Tali	28.07.2011	Male	15
Impact Diagram	Ghandia	13.07.2011	Female	20
	Dhang	13.07.2011	Male	19
	Ghandia	15.07.2011	Male	11
	Dhang	15.07.2011	Female	20
	Meer Mohammad Lakho	27.07.2011	Female	30

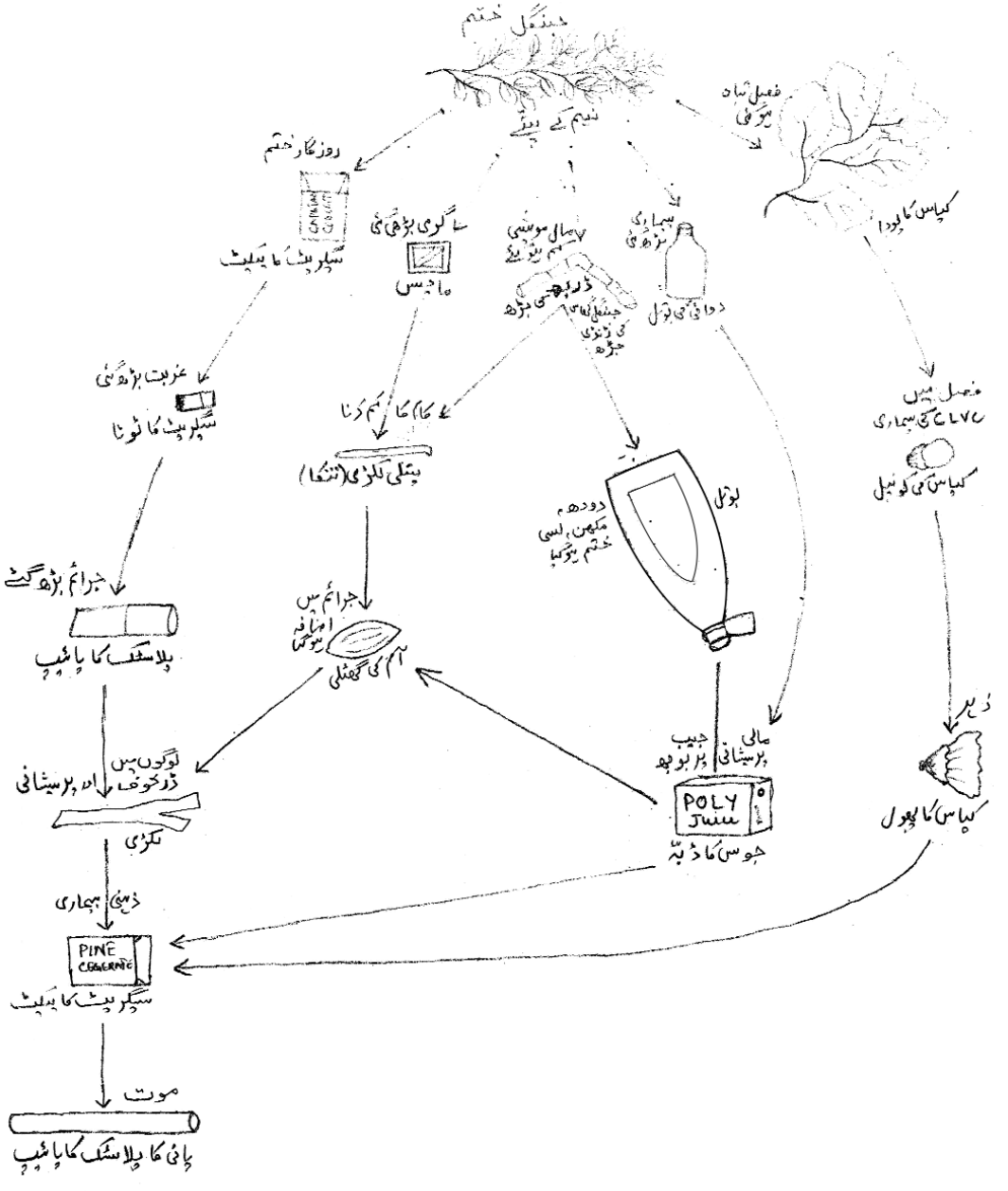
Details of Participatory Rural Appraisal Tools

	Village	Date	Team	Total participants
	Tali	30.7.2011	Female	26
	Tali	30.07.2011	Male	14
Social Mapping	Ghandia	12.07.2011	Male	20
	Dhang	12.07.2011	Male	15
	Ghandia	12.07.2011	Female	20
	Dhang	12.07.2011	Female	10
	Meer Mohammad Lakho	25.07.2011	Male	15
	Meer Mohammad Lakho	25.07.2011	Female	20
	Tali	27.07.2011	Male	19
	Tali	27.07.2011	Female	50
Decade Matrix	Ghandia	13.07.2011	Male	16
	Ghandia	13.07.2011	Female	20
	Dhang	13.07.2011	Male	15
	Dhang	15.07.2011	Female	20
	Meer Mohammad Lakho	25.07.2011	Male	15
	Meer Mohammad Lakho	26.07.2011	Female	20
	Tali	28.07.2011	Male	13
	Tali	31.07.2011	Female	30

Details of Case Studies

CASE STUDIES		
Village	Date	Team
Dhang	13.07.2011	Female
Ghandia	14.07.2011	Female
Ghandia	16.07.2011	Female
Ghandia	17.07.2011	Female
Ghandia	18.07.2011	Male
Ghandia	19.07.2011	Male
Ghandia	19.07.2011	Male
Dhang	19.07.2011	Female

Village	Date	Team
Meer Mohammad Lakho	27.07.2011	Female
Tali	28.07.011	Female
Tali	28.07.011	Female
Meer Mohammad Lakho	31.07.2011	Male
Meer Mohammad Lakho	31.07.2011	Female
Tali	01.08.2011	Male
Tali	01.08.2011	Male
Tali	02.08.2011	Male



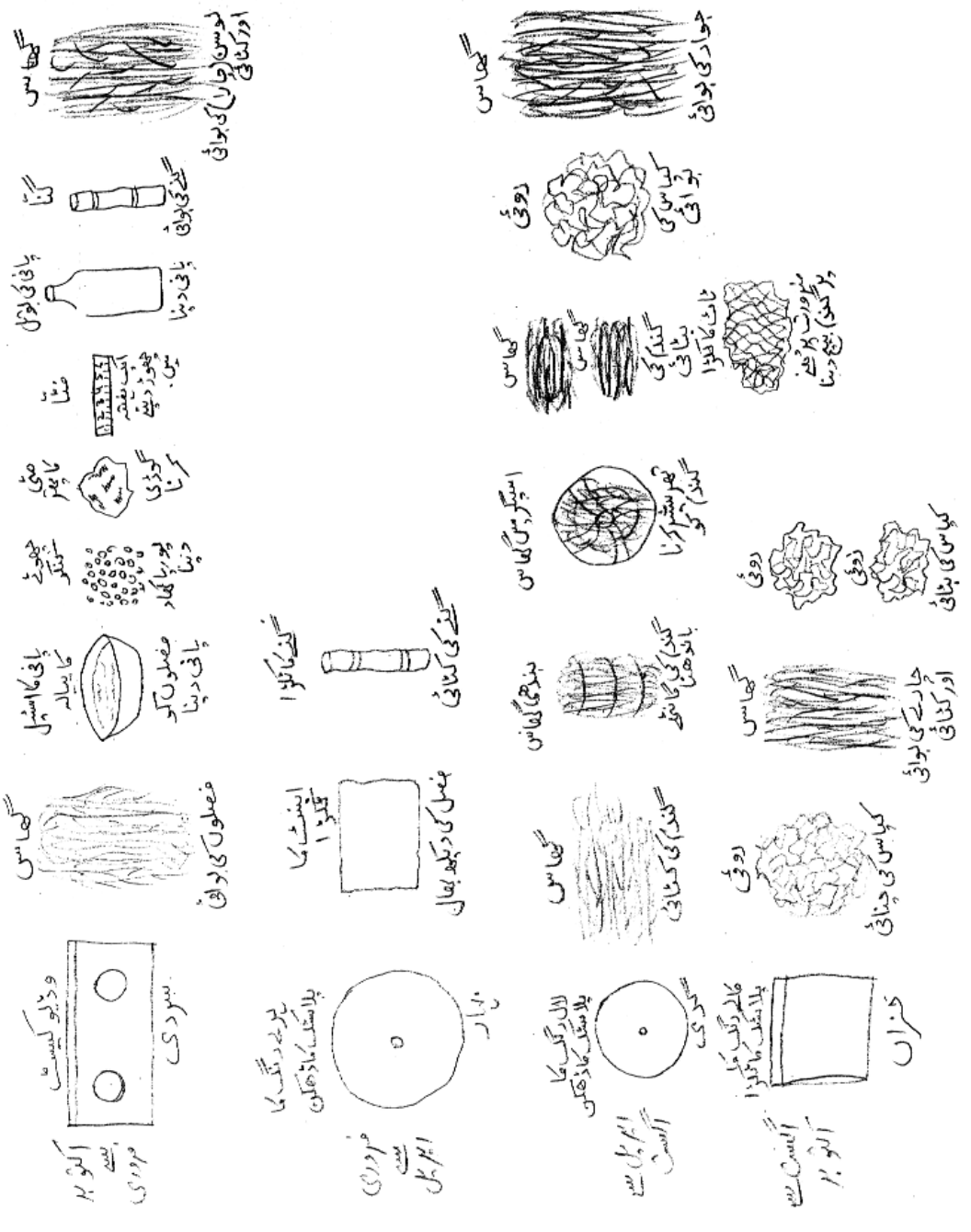
Group analysis of impact of change (development and climate) on community

DECADE MATRIX (Village Dhang)

1991	2001	2010
بارش زیادہ ہوتی تھی اور ان میں ایک تواتر تھا	بارش کبھی زیادہ کبھی کم ہوئی اور ان میں تواتر نہیں رہا۔	بارش بہت زیادہ ہوئی
مال مویشی سب سے پاس تھے جنگل اور چراگاہوں کی وجہ سے خوشحال تھے	چراگاہیں کم ہونے کی وجہ سے مال/مویشی کم ہوتے چلے گئے	مال/مویشی بہت کم ہو گئے۔ لوگوں کے پاس صرف اپنے کی ضرورت کی مطابق جانور ہیں۔
جنگل اور چراگاہیں بہت زیادہ تھیں۔ جس سے بہت فائدہ تھے	جنگل اور چراگاہیں آہستہ آہستہ کم ہوتے چلے گئے۔ اب تو لوگوں نے درختوں کو کاٹنا شروع کر دیا ہے	کچھ اور پیکے۔ دونوں سے علاقے میں جنگل بلکل ہی ختم ہو چکے۔
ہر سال برسات سے پہلے سیلاب آتا تھا۔ صدیوں سے یہ سلسلہ چلا آ رہا ہے	سیلاب کا سلسلہ منقطع نہ ہونے لگا۔ اس دہائی میں بہت کم سیلاب آئے	۲۰۱۰ء میں ایک بہت بڑا اور ظالم سیلاب آیا۔ جس سے بہت زیادہ نقصان ہوا۔

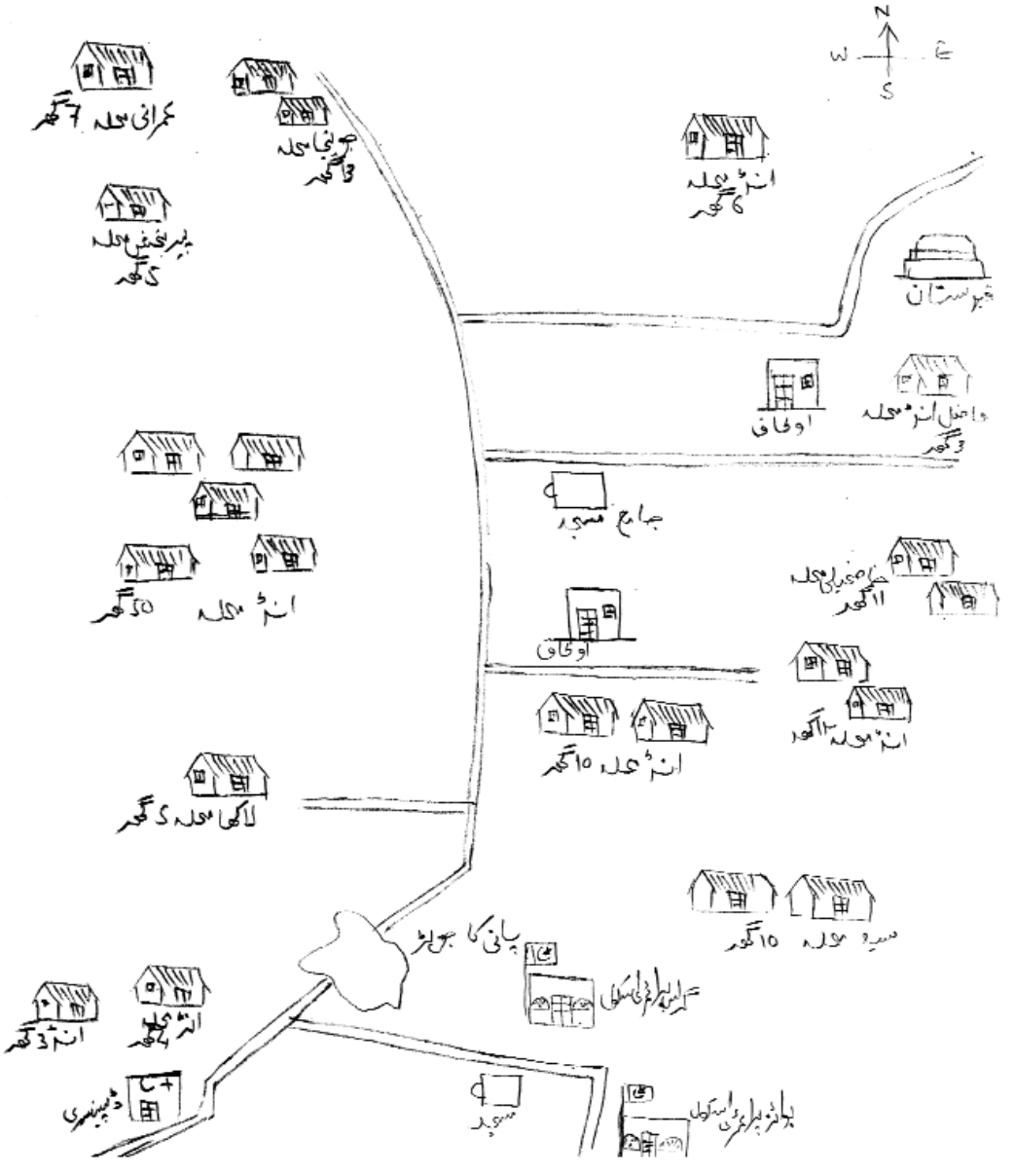
Group analysis of climate change by decades

SEASONAL CALENDER (Village Ghandia)



Group analysis of seasonal cropping patterns

SOCIAL MAPPING (Village Dhang)

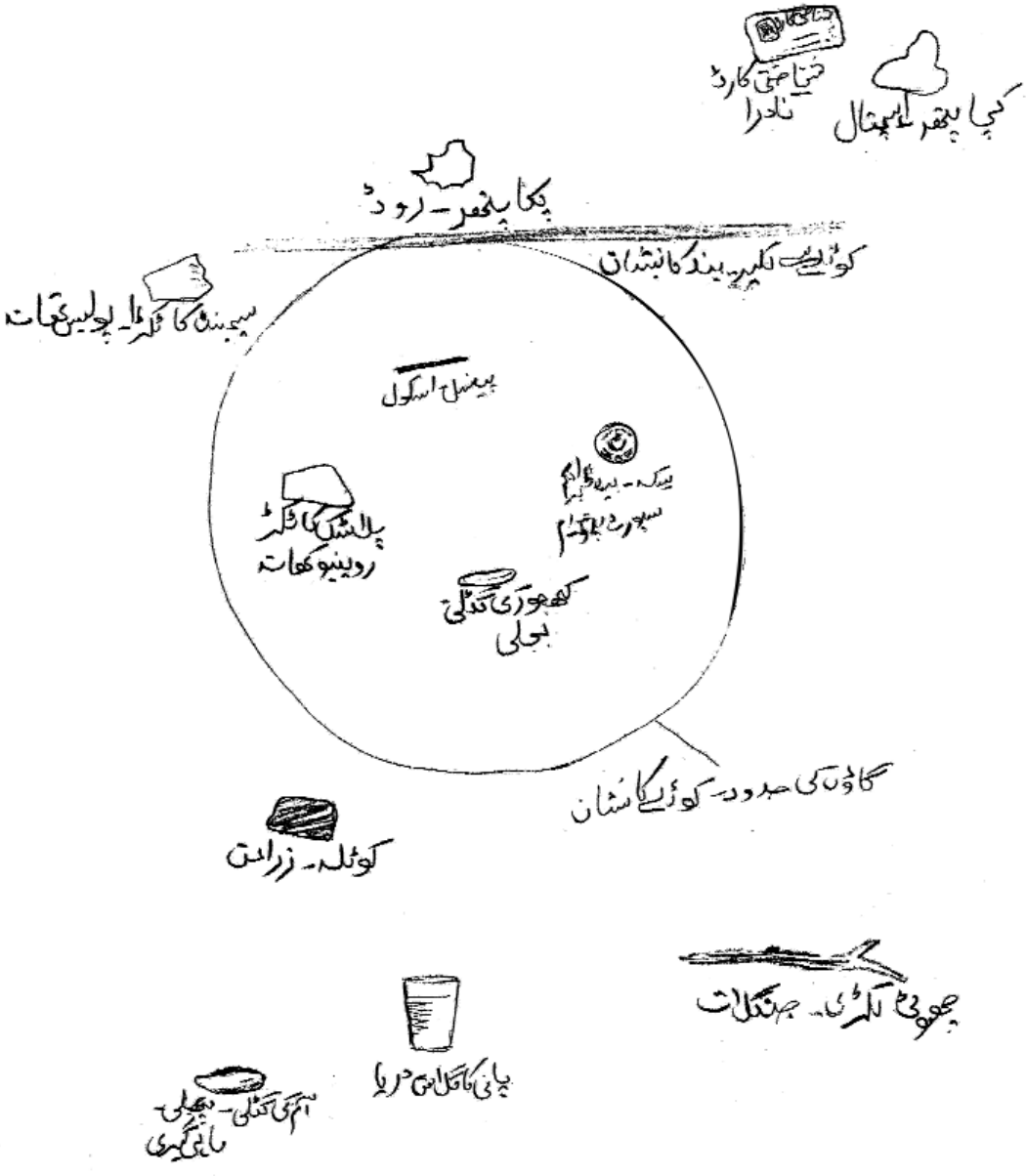


Village social services and neighbourhood clusters

WELLBEING RANKING (Village Tali)

Wellbeing ranking by categories of rich, middle income and poor with reference to assets, education and income

VENN DIAGRAM (Village Meer Mohammad Lakho)



Analysis showing public and private institutions and resources servicing the village

References

Anwar, Tahir, Imtiaz Ahmad and Seema Tahir. "Determination of Pesticide Residues in Soil of Nawabshah District, Sindh Pakistan" in Pakistan J. Zool., vol.44 (1): 2012: 87-93.

Cruz, Rex Victor et al. "Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change." Eds. M. L. Parry et al. UK: Cambridge University Press, 2007.

FAO and SUPARCO. Pakistan Rain/Flood 2011. Report on Flash floods, breaches in canals and damage to infrastructure and agriculture sectors in Sind Province: 24 Sept. 2011.

Farooqi, Anjum Bari et al. "Climate Change Perspective in Pakistan" in Pakistan Journal of Meteorology Vol. 2 (3): March 2005: 11-21.

Gadiwala, Muhammad Sohail and Naeem Sadiq. "The Apparent Temperature Analysis of Pakistan using Bio-Meteorological Indices" in Pakistan Journal of Meteorology Vol.4, Issue 8: January 2008: 15-26.

Harmeling, Sven. Briefing Paper: "Global Climate Risk Index 2012. Who suffers most from extreme weather events? Weather-Related Loss events in 2010 and 1991 to 2010." Germanwatch, 2011. 13 April 2012 <http://www.germanwatch.org/cri>.

Hussain Ata et al. "Analysis of Dust Storms Frequency over Pakistan During (1961-2000)" in Pakistan Meteorological Journal, Vol. 2, Issue 3: March 2005: 49-68.

IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Jamal, Haroon and Amir Jahan Khan. "Trends in Regional Human Development Indices," Research Report No. 73. Social Policy and Development Centre. July 2007. Retrieved from <http://www.relooney.info/SI_Expeditionary/Pakistan-Economy_104.pdf>.

Jamal, Haroon. "In Search of Poverty Predictors: The Case of Urban and Rural Pakistan," Research Report No. 59. Social Policy and Development Centre. December 2004. Retrieved from <http://www.spdc.org.pk/Publications/Research%20Reports/RR-59.pdf>.

Jamal, Haroon et al. "Mapping the Spatial Deprivation of Pakistan" in Pakistan Development Review 42 (2): 2003: 91-112. Islamabad: Pakistan Institute of Development Economies, 2003.

K.K Consultants. *Study of Riverine forest upstream Sukkar and downstream Kotri.* Pakistan: Indus for All Programme - World Wide Fund for Nature, 2008.

Khaliq, Bushra. "Pakistani women are worst hit by climate change." IV Online magazine: IV418. November 2009. 13 April 2012 <http://www.internationalviewpoint.org/spip.php?article1744>.

Khan, M.H. *Agriculture in Pakistan: Change and Progress 1947-2005.* Pakistan: Vanguard Books, 2006.

Khatoon, Dr. Surayya and Dr. Ghulam Akbar. *Natural Vegetation Assessment.* Pakistan: Indus for all Programme - World Wide Fund for Nature, 2008.

LEAD Scoping Study Report. "Pakistan's Options for Climate Change Mitigation and Adaptation." Pakistan: LEAD, March 2008.

Ministry of Education, EFA Wing. *Chapter 4 Sindh, Facts & Figures Pakistan 2002.* Islamabad: Government of Pakistan, 2002.

National Institute of Population Studies (NIPS) and Macro International Inc. (2008). *Pakistan Demographic and Health Survey 2006-07.* Islamabad, Pakistan.

"NGOs mushrooming in Sindh." The Nation. 21 June 2009. 13 April 2012 <http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/karachi/21-Jun-2009/NGOs-mushrooming-in-Sindh>

O'Brien, Karen, ed. CICERO Report 2000:2, "Developing Strategies for Climate Change: The UNEP Country Studies on Climate Change Impacts and Adaptations Assessment." Norway: Center for International Climate and Environmental Research, July 2000.

Planning and Development Department. *Sindh Vision 2030.* Pakistan: Government of Sindh, 2007.

Public Private Partnership Unit (PPPU) and Planning and Development Department, Government of Sindh. *Establishment of Special Economic Zones (SEZ) in Sindh, Modified PC-1.* Pakistan: Government of Sindh, 2009.

Rehabilitation Department, Provincial Disaster Management Authority. *Sindh Provincial Monsoon/Floods Contingency Plan 2011 (Draft Version 1.0).* Pakistan: Government of Sindh, 2011. Retrieved from <http://www.pdma.pk>.

Saulière, Saya."Climate Change and Women Farmers in Burkina Faso. Impact and Adaptation Policies and Practices." Oxfam Research Report. July 2011. Retrieved from <http://www.oxfam.org>.

Shirkat Gah Women's Resource Centre. *Preliminary Socio-Economic Baseline Study Report.* Pakistan: Indus for all Programme - World Wide Fund for Nature, March 2007.

Siddiqui, Rizwana. "Income, Public Social Services, and Capability Development: A Cross-district Analysis of Pakistan," in PIDE Working Papers 2008:43. Islamabad: Pakistan Institute of Development Economics, 2008. Retrieved from <http://www.pide.org.pk/pdf/Working% 20Paper/WorkingPaper-43.pdf>.

Sindh Irrigation and Drainage Authority, Sindh Water Sector Improvement Phase-1 Project, Preparation of Regional Plan for the Left Bank of Indus, Delta and Coastal Zone, Report Summary-Task I-33 (Draft). Pakistan: December 2010. Retrieved from <http://www.sida.org.pk>.

Social Policy and Development Centre. *Social Development in Pakistan. Annual Review 2004. Combating Poverty: Is Growth Sufficient?* Pakistan: Social Policy and Development Centre, 2004.

Statistics Division, Agricultural Census Organization. *Sindh 2008 Mouza Statistics.* Government of Pakistan, 2009.

Statistics Division, Agricultural Census Organization. *Pakistan Agricultural Census 2000*. Government of Pakistan, 2000.

Suleri, Dr. Abid Qaiyum and Sahib Haq. *Food Insecurity in Pakistan.* SDC, SDPI, WFP, 2009.

Tabassum, Firdous. "Impacts of Climate Change on Pakistan." Unpublished M.Phil. Dissertation, Department of Environmental Sciences, Kinnaird College for Women, Lahore, Pakistan, 2009.

Tahir, Dr. Muhammad Aslam et al. "Technical Assessment Survey Report of Water Supply Schemes. Sindh Province." Islamabad: Provision of Safe Drinking Water Project, Pakistan Council of Research in Water Resources, Ministry of Science and Technology, November 2010.

UNICEF. "Pakistan Monsoon Floods. Immediate Needs for Women and Children Affected by Monsoon Floods. 5 August 2010." Retrieved from <http://www.unicef.org/infobycountry/files/UNICE__Immediate_Needs_Document_for_Pakistan_5_August_2010.pdf>.

Zahid, Maida and Rasul, Ghulam. "Rise in Summer Heat Index over Pakistan" in Pakistan Journal of Meteorology Vol. 6, Issue 12: 2010:85-96.

Zaman, Farrukh. "UN climate summit: Pakistan tops climate-risk index." The Express Tribune on the Web. 30 Nov 2011. 13 April 2012 <http://tribune.com.pk/story/299910/un-climate-summit-pakistan-tops-climate-risk-index/>.

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