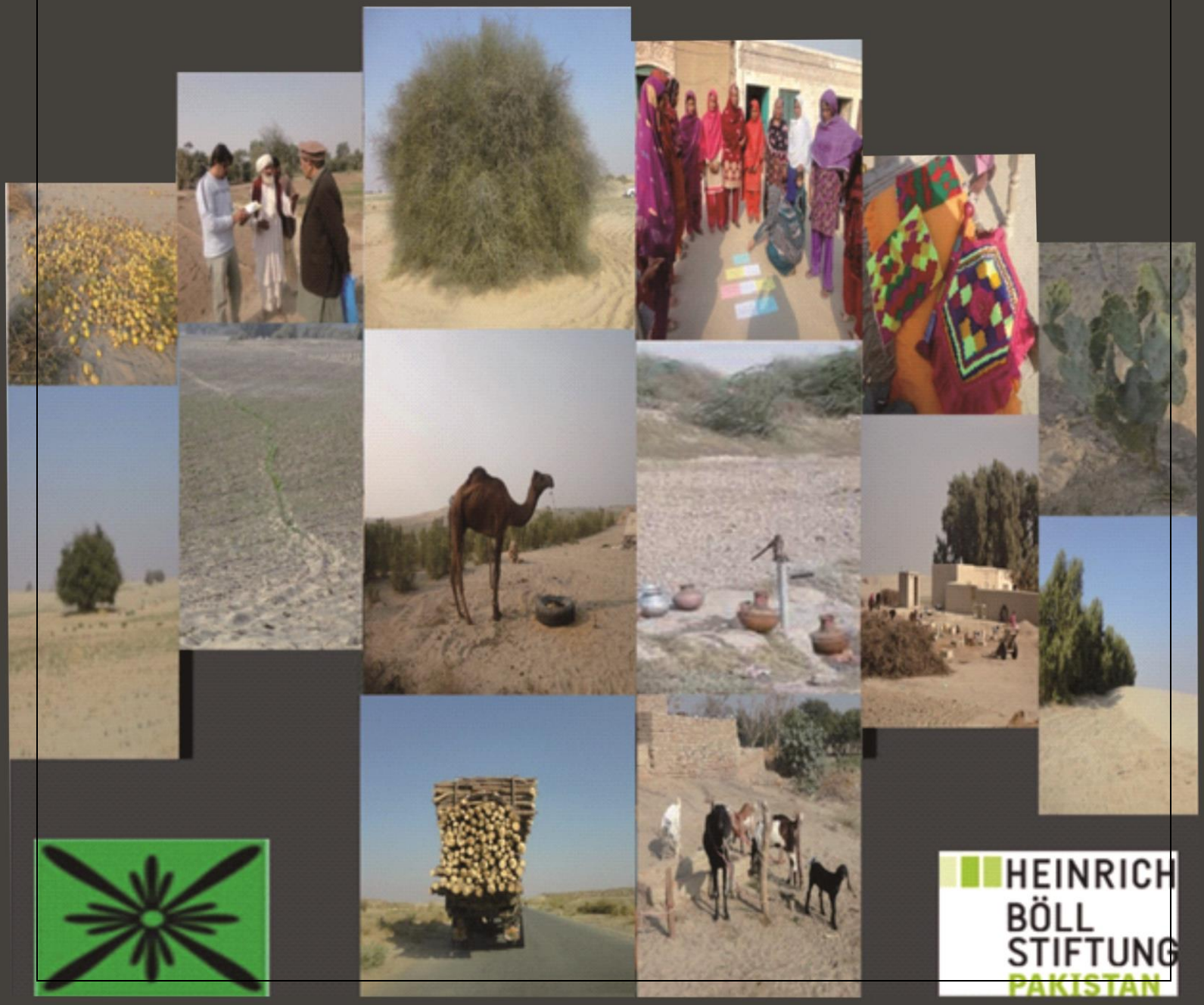
Thal Desert:

A Research Study on Understanding Desert Ecology and Livelihood Patterns - 2013



HEINRICH BÖLL STIFTUNG PAKISTAN

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Acronym and Vocabulary of Local Words

Aak	Calotoropois spp
Arthi	Trader or Commission Agent in the market where farmers sell their produce or buy inputs
Barani	Rain Fed
Bastee	Scattered settlement of few houses in the desert
Bairoon	Desert area distinguished from irrigated area
Beri	Ziziphus Jajuba
Bhaitak	A place or room where outsiders are received and entertained
BHU	Basic Health Unit
Channa	Chickpea
FGD	Focus Group Discussion
Guara	Guar Beans
Harmal	Paganem Harmala - Local weeds having medicinal properties used for various ailments
Karela	Bitter Gourd
Karir	Capporisdecidua
Kartuma	Desert Gourd (Citrullus Colocynthis) used in traditional medicine for curing human and animal ailments
Khaggal	Tammarisk - Tenacious tree grown in Thal desert which survives in drought
Khoo	Traditionally water-well with settlement of few houses
Kikar	Acacia
Lassi	Yoghurt drink
Layie	Local Shrub i.e. Tamarisk dieica
Marecha	Local name for Camel
Mouza/Patti	Officially one large village consisting of several 'Bastees' settlements
Rakh	Rangeland
RHC	Rural Health Centre
Shareen	Local tree grows and survives well in Desert. Used for fuel and fodder
Talor	Houbara Bustard
TDA	Thal Development Authority
THQ	Tehsil Head Quarter
Tibba	High Ridge of Sand
Tori	Squash
UC	Union Council

EXECUTIVE SUMMARY

Thal desert consists of sand dunes ridges with some flat land where people live in scattered settlements. The area is rain fed and deficit in resources and infrastructure with almost no schools, health services, electricity, water & sanitation. Most of the farming communities own less than 5 acres of land which is of low quality. The poverty is widespread in the desert. Major source of livelihood is agriculture and livestock rearing the underground water is brackish but still used by some farmers for growing some wheat as a staple food. The main cash crop of Thal desert is "Channa" or gram which provides livelihood for people. If this crop fails due to no timely rain, drought or/and frost it causes serious losses to farming communities who come under heavy indebtedness which they cope either through selling their animals or migrating to irrigated areas. Another serious problem is a shifting sand dunes due to windstorms which are a normal feature which causes severe soil erosion. The sand dunes are also destabilized by over grazing, cutting of trees and bushes when ploughing for cultivation. The ecology of the area is fragile because of sparse vegetation and resilience resulting in low bio-diversity. The whole situation is further exacerbated due to climate change which is now an inevitable fact and Pakistan is ranked as one of the most vulnerable countries.

There is no doubt that the desert communities have lived in the area since centuries and have adapted to adverse physical environments. They have deep understanding of existing resources and have maintained their living patterns accordingly. However, there is an ample scope for enhancing livelihoods opportunities for the communities in changing climate by bringing in new knowledge and ideas and systematically integrating them with traditional indigenous knowledge and skills.

This study was undertaken at a micro level in 5 Bastees of UC Chobara, tehsil Chobara, District Layyah to understand and document desert ecology and socio-economic condition of people living in the area. It is expected that this would help in taking some initiatives with regard to adaptation strategies in changing climate for improving livelihood opportunities of desert communities living in abject poverty.

CHAPTER 1

The Background

1.1 INTRODUCTION

There are three ecological zones in Punjab i.e. Barani (rainfed) Districts, Northern Irrigated Districts and Southern Irrigated Districts including Cholistan. Layyah is located in Barani area and situated between the rivers Indus and Chenab in the central area of Pakistan. The district is more fertile on western side near the Indus River and barren in the east. As we go from west to east, soil fertility decreases and at the extreme east there is **"Thal"** desert with various forms of sand ridges and dunes. The western areas of the district Layyah are canal irrigated while the eastern part is rain fed.

As far as geographical position of "Thal" is concerned, Bhakkar district is in the north, Muzaffargarh is in the south, Jhang is in the east and Tehsil Taunsa Sharif of D.G Khan District is in the west across the Indus River. As per Population Census 1998 the population of Layyah district was 1.1 million, out of which 87.2 % was rural. Majority of the population depends upon agriculture for their livelihood.

District Layyah is one of the least industrially developed districts of Punjab with widespread poverty particularly in desert areas. They suffer from poor socio- economic and living conditions and the difficulty of access to resources and opportunities. In addition desert areas falling within district Layyah are exposed to climate change which is affecting their livelihood and ecology. The communities living in the desert are less aware of the negative impact of climate change and adaptation and mitigation measures they can undertake. This study was conducted with an objective to understand desert ecology in the context of climate change, its impact on livelihood s and food security. The main objectives are as under

1.2 OBJECTIVES OF THE STUDY

- To understand and document climate change process in desert ecology
- To study the existing food security system and threats due to climate change
- Build capacity of desert communities in climate adaptation

1.3 METHODOLOGY

The study area of Chobara was selected due to its vulnerability in terms of its inhabitants who are exposed to threats of climate change and its impact on their livelihood and food security. The field visit for the study was conducted from 2-5 December 2013 in "Thal" desert of Chobara Union Council (UC), Tehsil Chobara, District Layyah. For data collection a cluster of 5 *Bastees* little deep in the desert (10-15 km from Chobara) was randomly selected within an appropriate radius keeping in view the time available . The Data was collected using qualitative methods based on:

- Holding 5 Focus Group Discussions (FGDs) each with male and female groups.
- Interviewing key informant particularly older people and some teachers.
- PRA exercise with selected group of male and female was also done for getting some relevant information of *Bastees a*nd surrounding areas.

Meetings were also held with officials of various departments of Tehsil Municipal Administration (TMA) at Chobara i.e., Agriculture, Livestock, Health, Forest and Education Department including secretary of the union council Chobara for collection of valuable information. It helped in verifying data collected in the field from groups of local communities.

The study team comprised two male and two female researchers who were engaged for collection of data separately from female and male groups. Female researchers conducted FGDs with females within the household courtyard where women gathered while males conducted FGDs for male groups outside their houses where male strangers are received and

entertained place called “Bhaitak”. Prior to going to the field all researchers under the supervision of a senior researcher were given orientation and background of the study. The guidelines/ questionnaire prepared for the purpose was also explained to them.

The notes taken during the field visits were elaborated and gaps filled on daily basis after returning from field in the presence of all team members.

CHAPTER 2

Description of Thal Desert and Area Profile

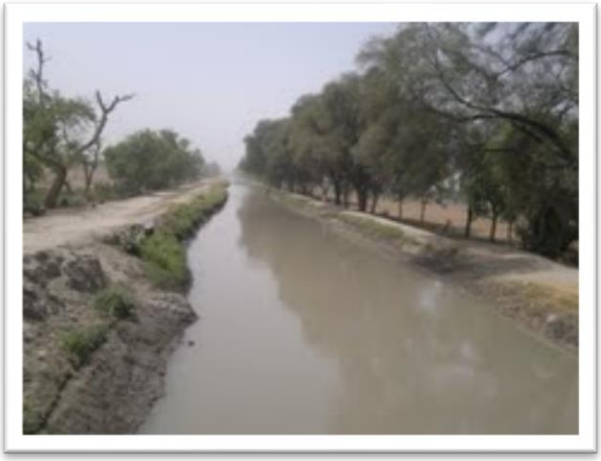
2.1 BRIEF HISTORICAL BACKGROUND OF THAL DESERT

The Thal desert is located in the Province of Punjab on Sindsagar Doab- *an area between two rivers*. It is a vast area between the Jehlum and Indus rivers south of the Pothohar Plateau. It covers an area of about 190 miles long from north to south and 70 miles (110km) wide from east to west. It resembles the Cholistan in Punjab and the Thar deserts in Sindh geographically. It is divided into six districts namely; Khushab, Mianwali, Layyah, Bahkkar, Jhang and Muzzafagarh. Some of the main towns of the desert are Mankera, Roda Thal, Mari Shah Sakhira, Mehmood Shaheed, Dullewalla, Shahi Shumali, Chowk Aazam, Jiasel, Jandan Wala, Noor pur Thal, Rang pur, Hyderabad Thal, Shah Wala and Piplan.

There are many tribes in the desert namely; Tiwana, Sial, Mammak, Bhachar, Baghoor, Rahdari, Jhammat, Cheenna (Jutt), Gahi, Aheer, Lashari, Wagha's and Awans etc. The locals of Thal basically speak 'Seraiki' but Punjabi is also spoken by many in the desert.

Prior to 1947 under British colonial administration the area of these districts was almost all deserts. After partition of India into two independent countries the Government of Pakistan established the Thal Development Authority (TDA) in 1949 with the objective of transforming large parts of Thal desert (measuring some 2.6 million ha) into agriculturally productive land.

Modeled after the great canal colony schemes, the TDA represents the south-westward expansion of irrigation schemes in the postcolonial era. The TDA projects embodied national aspirations for development as well as new uncertainties faced by



the Pakistani state in its early days. Land reclamation in Thal, along with construction of large dams was seen as the solution to the challenges of food security, settlement of refugees and economic development. The building of metaled roads, canals and other relevant infrastructure took on added significance as they embodied the ideals of self-sufficiency and national modernity in a remote hinterland. Thal's inhabitants predominantly had pastoral modes of livelihood and cattle rearing was a main activity in the region.

The development of the area changed the Thal's complex ecology by regarding it as a wasteland. As a result of the development of canal system, settlement of people and reclamation of land for agricultural purpose grazing lands were diminished overtime, population of wildlife once in abundance and area rich in flora fauna almost vanished or diminished.

2.2 PROFILE OF DISTRICT LAYYAH

District Layyah is situated in Province of Punjab towards south west of Islamabad at a distance of 450 Km. In its north, is situated the district Bhakkar while at its west, flows River Indus. Across the river there is Dera Ghazi Khan which is also the district of Punjab. District Jhang is located in the east and Muzaffargarh is located in the south of this district.

It appeared as a district in the province of Punjab in 1982. The district name is derived from a commonly grown shrub, 'Layie' (Tamarisk dieica) used as fuel wood which covered most of the area of this district.

It consists of a semi-rectangular block of sandy land between the Indus and Chenab rivers. District Layyah covers 6,291 sq. Km, with a width from East to West of 88 Km and a length from North to South of 72 Km. Its population, as per census of 1998, was 1,121, 951, with population density of 178.2 people/sq. km. Majority of the people here are linked with agriculture which is found both in irrigated and desert area. The nature of farming of course is different in both cases. Layyah was declared as the poorest District of Punjab (1998 Census Report) .

The climate of the district varies from very hot in summers and too cold in winters with the highest temperature of above 45 degree centigrade in June and lowest up to 02 degree in January. The district receives only scanty rainfall, the average rainfall does not exceed 18.7 centimeters which is mainly in the monsoons (July-August), although some exceptions have occurred occasionally in the past e.g. in 1980-81, it was as high as 54.4 centimeters1. It is evident that there has been an overall declining trend in the frequency and quantity of rainfall in the district over a period of several decades.

Administratively, the district comprises of three tehsils, i.e., Layyah, Chobara (where study was conducted) and Karor Lal Esan The tehsil of Layyah and Karor Lal Esan are comparatively better developed agriculturally but they have also large tracks of sand dunes and uncultivated land. Whereas, tehsil Chobara is almost desert and barren. The major Union Councils (UCs) of desert are Chobara, Rakh Kheray Wala, Nawan Kot, Rafiqa Abad, Jamal Chapri , Sher Garh, Aulakh Thal Kalan and 452 TDA.

2.3 STUDY AREA PROFILE

The study was conducted in 5 desert Bastees of UC Chobara which is located 60 Km from Layyah towards east at Faisalabad/Jhang Road. The Chobara is also a Tehsil Headquarter (THQ) with typical rural settings. It was established in 2005 as Tehsil. Prior to this, in fact, it was a small roadside bus stop where some shops were set- up for some economic activities by people living around. At the time of our visit it was observed that government offices were still being built and human settlements and commercial activities along the road will be on the rise gradually.

According to 1998 Census the Population of Union Council Chobara was 30,618 which certainly may have multiplied many fold since then.

The Tehsil Chobara is almost barren and consists of some natural vegetation and sand dunes. It is surrounded by a nearby a 'Rakh' or rangeland under the control of Forest Department of the Government of Punjab which is located along layyah-Jhang road at a distance of 15 Kilometer from THQ Chobara. Total area of Rakh Kherewala is 31,647 acre and the economy of the areas is mainly pastoral. The rangelands have largely been depleted due to over use. The carrying capacity of grazing areas has been drastically reduced. The unsustainable use of the barani or rain fed lands and ever expanding human population and their dependence on already exhausted land resource further adds to the deterioration process.

The population of Chobara tehsil is all rural as no major town exists. The area distinguishes by its low and erratic rainfall, high atmospheric aridity, abundant sunshine, heat, strong dust-raising winds and sparse vegetation cover. High sand dunes and sandy plains cover most of its surface. In the region one can see numerous species of local grasses, shrubs and trees. The fauna is tenacious enough to withstand extended drought. But the problem is of their overexploitation leading to a greatly depleted cover.

2.4 SETTLEMENT PATTERNS

The settlement pattern in the area is influenced by the geography and agro-ecological setting. Relatively large and nucleated villages are located in the fertile and irrigated areas where agriculture has been developed extensively. On the contrary in sandy desert which is popularly called as '*Bairoon*' there are smaller, scattered and humble habitations of semi-nomadic population. The Chobara Tehsil, which is largest in respect of the total area and minimum in terms of population, with a minimum percentage of people/Km, is a typical example of small human settlements as the local ecology cannot support large human concentrations at any given place in this Tehsil. Most people live in cluster of households called "*Bastees"*. The Bastees are scattered in the desert which stretches from Chobara to deep inside desert about 30 or more km towards Rangpur in south adjacent to

District Muzaffargarh. Usually around one Bastee there are 4-5 “Khoos” (well- settlement)) where people have settled on their land with their extended families in houses mostly built of mud and/or backed bricks. Most people are small land owners including some leaseholder tenants who depend on agriculture and livestock for their livelihoods. Major crops grown in the area are *Channa/G*ram/ chickpea and wheat depending on timely rainfall. Yield is very low due to poor soil and unpredictable rain.

The surveyed Bastees were located about 10-15 km inside desert from Chobara. The metaled road inside desert was only available till 10 km towards south from the main road at THQ Chobara. While most Bastees were connected with each other through sandy pathways which usually disappear during wind storms and difficult for strangers to find out the right pathway This poses a serious danger for strangers to get lost in the deep desert.

The population of the Bastees was found to be living in scattered and

isolated hamlets. Several Bastees together officially form a village (Mouza/Pati). Thus the village may be spread over several kilometers. The major tribes or castes who consisting of Lail, Warriach, Sundhu, Kamboo, Ranjhay and Sial were living in the surveyed Bastees. The number of Households on each Bastee varied minimum from 20 to maximum 100 and family size was 7-10. Following Table No. 1 depicts the detail of Households, tribes and family size.

Table 1: No. of Households and Major Social Groups in Survey Bastees

Sr. No	Name of Village	Union Council	HH No.	Family Size	Major Caste
1	Cha Kho Wala	Chobara	20	8 to 9	Lail
2	Cha Ganji Wala	Chobara	25	9 to 10	Lail
3	Borang Wali Haq Nawaz	Chobara	30	7 to 8	Lail, Waraich, Kamboo, Sundhu
4	Basti Malook	Chobara	60	8 to 9	Lail, Waraich, Kamboo
5	Kho Lundi	Sher Garh	100	8 to 9	Ranjhay (98 % and Sial 2 %

2.5 Use of Energy and Communication Technology

All the Bastees had **absolutely no electricity at all**. Some people were reportedly using kerosene oil in lanterns for night lighting which emits carbon CO2 and is a health hazard. It was reported as a major cause of respiratory diseases particularly among women and children. In addition, the use of kerosene for lighting costs about Rs.800-900 per month per household. It was also revealed that recently some people have also started using low quality and cheap portable solar Torches or operated on battery cells lasting only few days and incurring them reasonable cost, difficult to afford for them.

Similarly, almost all households for cooking meals were using fuel wood from Khaggal tree, bio-mass and

shrubs collected from the surrounding areas. They were supplementing this with some dried cow dung as well. When asked about "do they know about fuel efficient cook stoves"? They had no idea at all about such cook stoves.

In almost every household the use of mobile phones was found common rather possession of an average of two mobile phones per household were reported. The use of this technology, as told by the people has helped them in better communication with people living around different *Bastees and* market. Particularly it was useful during health emergencies among women when they had to call some "taxi" from Chobara for transporting patients to hospital. The use of mobile phone was found very positive despite some of the cost incurred on this service. This technology can be used for dissemination of information and creating awareness on relevant issues

.

2.6 Education, Health and other Infrastructure

Literacy and Education rates in surveyed villages were one of the lowest in the province of Punjab. Women literacy was negligible particularly among elderly and middle aged women as only small girls were reportedly going to schools and it all depended on availability of primary school near the *Bastee*. Out of the 5 surveyed Bastees the primary school was found only in one Bastee. The school after fifth grade was available only at the THQ Chobara some 15 km away where people do not send their children particularly girls due to long distance, lack of transport facilities, resources and cultural reasons. Male literacy among young people was found to be comparatively better than women.

There were no health facilities available at all in the surveyed Bastees. The nearest Rural Health Centre (RHC)/Basic Health Unit (BHU) was located at a distance of 15 Km at the THQ Chobara. During emergency particularly among women's delivery cases they reported acute problem. Health issues emanating from poor diet and resulting malnutrition were significant. High incidences of low

birth babies and high infant and maternal mortality rates were reported as a major concerns for people.

2.7 Water and Sanitation Facilities

There was no indoor latrines in the households except in one Bastee where one proper latrine outside of the houses was seen. Not a sigle Bastee had any piped water facility, however, they all had Hand Pumps for drinking water, albeit brackish which was available at the depth of 30-35 ft. Many people reported chronic stomach ailments particularly among children due to quality of available water. Some male members of the households were seen fetching water on motorcycles in containers from far away water supply points either from Chobara or from irrigated areas at the neighboring boundary of desert.

In the absence of sanitation facilities at the Household level particularly women shared with female members of the research team their problems of night time defecation and danger of snake bite. In this regard some cases were also reported from the area.

CHAPTER 3

MAJOR FINDINGS

3.1 AGRICULTURE AND LIVESTOCK AS A SOURCE OF MAJOR LIVELIHOOD

Development of sustainable livelihoods in hot deserts region is a major challenge due to fundamental environmental constraints: scanty and erratic rainfall, with

high variability of precipitation across a season and across years, Frequent drought, extreme temperatures, Highly fragile eco-system marked by sparse vegetation, acute scarcity of quality water for drinking and irrigation.

These constraints are compounded by remoteness of habitations, poor communications- network and negligible development. In these circumstances, subsistence agriculture, supported by animal husbandry is the only available livelihood options.

What is legally classified as agricultural land is available in desert areas, and landholdings also tend to be small on an average less than 3-4 acres which include also undiluted land. However, yields are low due to lack of insufficient irrigation facilities, and low fertility of soil.

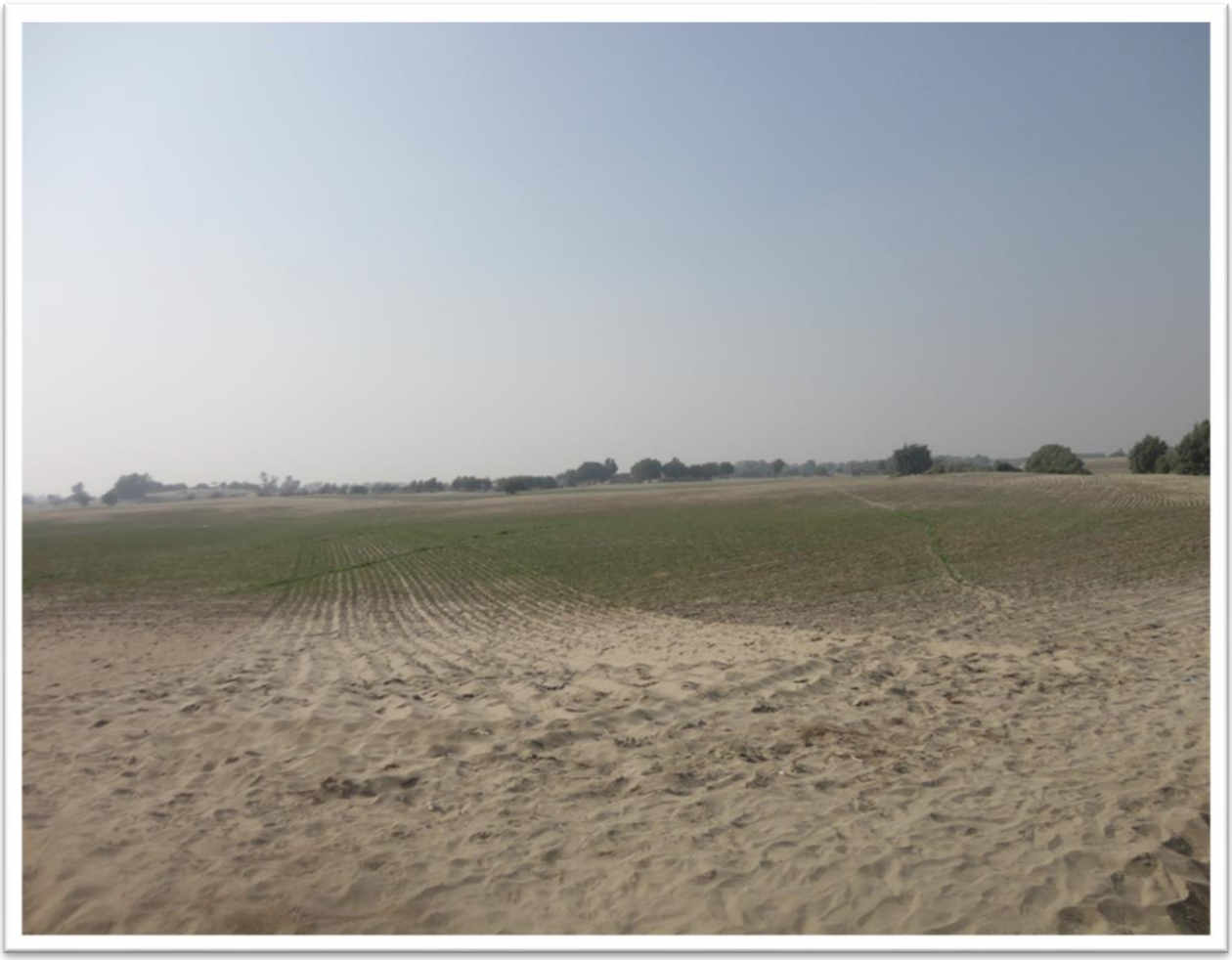
Animal husbandry is also constrained by scanty availability of grass and native tree leaves. Permanent pastures are highly degraded and neglected. Increased grazing pressure has led to disappearance of many species and decline in biomass yield. The nearby *Rakh Kharewala*/ range land at Chobara may be quoted as an example.

3.2 Wheat and Channa (Gram/Chickpea) – A major source of Livelihood and Food Security

The main crops grown in the area include chickpea, wheat, guar and some fodders for livestock **i.e. lucern, barseem and sorgum**. Wheat which is a major source of food security for people is cultivated on small piece of levelled land adjacent to their dwellings usually cleared from sand

dunes. This piece of land is irrigated using tube-well water available at the depth of more than 120 ft. The tube-well water also serves for growing some fodder and vegetables – mostly spinach which withstands brackish water.

Chickpea is widely grown on unlevelled land locally called "*tibbas*" and is the major source of livelihood of people in this desert. Its production entirely depends upon intensity and distribution of rainfall.



There are two main types of chickpeas, distinguished by seed size, shape and colour. The first relatively small seeds black in colour is called *Desi* or indigenous and with large seed brown in colour called *kabuli (*Hybrid). Overtime productivity of chickpea ranges from 400 to 800 kg/ha. In Thal desert, where no other crop grows so successfully, it plays a vital role in the cropping systems of subsistence farmers. It helps in the management of soil fertility, particularly in dry areas of the Thal desert. It leaves substantial amount of residual nitrogen behind for subsequent crop and adds much needed organic matter to maintain

and improve soil health, long-term fertility and sustainability of the ecosystems.

Chickpea is drought tolerant cash crop and thus is the major wealth for the people of Thal Desert. All social activities of the farming communities like marriages, sickness of human being, and livestock rearing are mostly linked with the success of this crop. There was a wide gap between potential and actual yield, which may be attributed to various constraints, e.g., raining pattern, crop management, labor management, and infrastructural constrains.

Although it is one of the major cash crops but most farmers were facing acute problem of availability of good quality seed which reportedly they had to buy on ***"Due".*** It means they buy from the local *Arthis/traders* on credit and pay almost double in kind at the time of harvest. Because of this prevalent practice majority of the farmers reported **indebtedness.**

In addition because of the above noted situation rapid change in climatic conditions with scanty rain, high variability of precipitation across a season, frequent drought and extreme temperatures were reported. It was learnt that few years ago during winter the unexpected heavy frost reported to have their chickpea crop damaged resulting in the loss of only source of major livelihood. Even fodder crops and local tenacious tree were also burnt out because of the frost. The loss of livelihood was very severe and people had to cope with this situation through selling their animals or/and migrating to irrigated areas.

At the time of writing this report, it was reported in" **DAWN" of 3rd January 2014** that " as temperatures have touched the freezing point in last week of December 2013 in many parts of the country, farmers are having a tough time amid threats to their crops. Gram crop was also under pressure situation as all those areas known for this crop are also facing biting chill without much rainfall. The cold spell has jeopardized the prospects of a good crop. Other crops are also under threat of extreme weather and chill".

Similarly, when it was discussed with the communities that how they cope with this? They said "it is God's will we cannot do anything as weather is changing and affecting our livelihood". They were also asked whether night Dew has any effect on their crops. It was reported that when it falls for few months it creates positive affect on crops by keeping them moist and increase in productivity.

Apart from cultivating Chickpeas, those having Tube-well facilities can grow other crops as well, as stated above.. Productivity of crops varies depending upon and quality, management applied on crop and availability of resources. Wheat and Guar Straws are also saved by developing simple storage structures to feed animals in slump periods. Few years' back Guara Crop was totally rain fed as pointed out by large number of people but heavy mixing in seeds resulted in non-availability of such seeds thus decreasing the trend and currently hybrid and mixed seeds were available demanding high inputs costs that was tough for deprived farmers living in deserts. Inputs like seed is the basis of crop production, which acts as genetic carrier, and use of quality seed of high yielding varieties is, therefore, the key, which unlocks the door to dramatic surge of the productivity when combined with the use of other inputs under favorable environmental conditions (Shah *et al.,* 2007).

The climatic uncertainty due to erratic rainfall in the Thal desert is the main obstacle of crop production under rain fed conditions. During the drought periods, all the produce is vanished and even farmer had no seed to sow for the next year. Seed production needs some special emphasis to maintain the quality and purity. Farmers give little attention for their home produced seed and have no difference in grain and seed. Farmers did not distinguish between varieties of irrigated and rainfed areas, which is a serious constraint in overcoming the issue of low productivity (Mehmood *et al.,* 1991). Farmers need training in seed production and storage techniques so that its viability is maintained.

Most of the framers told to the field team that no vegetables are grown in the area largely due to salty nature of water. Those having ground water facilities in terms of Tube-wells also were of the view that no vegetables lasts in those climatic condition particularly in summer heat. Only spinach was the sole vegetables grown by the farmers in winter season and in summer hot winds and extreme temperatures burn most of the vegetables grown. When they were asked whether they have tried other vegetables and all of them said "No" except one farmer who told us that he had experimented with

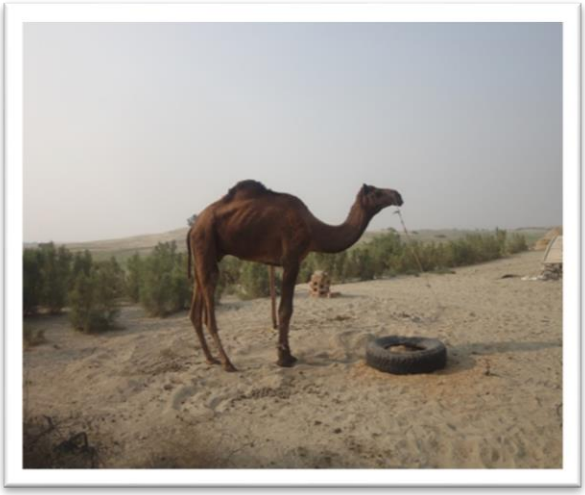
different vegetables and have grown them successfully.

It was learnt that nearly each house hold buys vegetables from the market thus spending about Rs. 2000-3000/month. However, when they were told that it was possible to save this amount of money if they grow different vegetables as "Kitchen Garden" for home consumption, they said that water was a major constraint.

There was serious lack of knowledge on farmers' part about experimenting with different vegetables and their management.

3.3 Livestock

Livestock as a sub-sector of agriculture is an important source of livelihood for farming communities. Cattle are the most precious livestock species of rural lifestyle followed by Goats, sheep and camels. It was learnt that almost all households keep these few animals. However camels locally called "*Marecha"* was reported by negligible households. As told by people that "its utility has been reduced with the use of other modes of draught power for cultivation and transportation." The number of animals depended upon availability of fodder. The animal population was reported to have been decreasing overtime as the grazing areas are shrinking as compared to 20-30 years ago. It is because of increased settlements in the desert area and resultantly diminishing vegetation.



The field team was told that 20-30 Years back, ample grazing was available for livestock; people normally allowed their animals to roam around freely for grazing in the open range areas of the desert. After grazing whole day in the desert animals would returns home in the evening. Disease outbreak was limited and Indigenous treatment methods were used for curing. But now, hybrid animals are also raised that require high input cost and intensive method of rearing. Local skills in terms of treatment and handling are dying out at an increased rate and currently few elderly people knew about Ethno-veterinary Practices. Now outbreak of new pests and diseases in the area for the past few years were reported which usually result in increased mortality rate in animals and high treatment and curing cost for poor farmers where resources are negligible.

Mortality rate among cattle was reported high and the main causes of mortality was related to droughts , shortage of feed and water and diseases caused by nutrition stress. No livestock health facilities were available in the desert, only limited services were available in poorly equipped small unit in Chobara and vaccination of livestock was not practiced regularly. When the LSF team visited local veterinary unit, no doctor was present there except one guard and junior assistant who told the visiting field team that " very few people bring their animals at the centre but Doctor sometime goes to check animals on call".

No Veterinary health centers or hospitals were available towards the interior of the desert at all. Livestock owners often become distressed and helpless when their livestock, particularly cattle fall seriously ill. Some traditional homemade herbal preparations were used to treat sick animals. The mortality rate was reportedly very high and drought conditions reportedly increased stress due to malnutrition and lack of water causing various diseases.

At the same time local breeds of animals was reported to have been near extinction and replaced by other exotic breeds. The local breed of goat called "Daira Din Panah" was not seen in the area. The animals , as stated earlier, were an important source in coping with the negative impact of changing climate. For

example, in case of major crop failure, particularly of Gram/chickpea they sell their animals.

3.4 SCARCITY OF WATER

In the desert area acute scarcity of water for drinking and irrigation was reported. The farming is dependent on rain water and underground water though available in limited quantity is brackish. However, some with financial resources had installed their small tube wells at the depth of 125-150 ft. run on diesel operated engines and use water for irrigating small plots of land cleared from sand where they grow wheat and other minor crops. Some people reported growing vegetable like spinach only, as mentioned above, due to salty nature of water as other vegetables reportedly were not possible due to this effect and non-availability of water particularly in summer. The wheat grown by the communities on small plots was one of the major sources of staple food, thus food security.

The use of brackish water for irrigating crops mainly Guar, Wheat and Fodder no direct impact was shared by respondents except decrease in production and yellowing of crops that might be due to some other factors. Farmers knew little about rain water harvesting and efficient usage of techniques and technologies. However, Brackish

water and extreme temperatures added with frost in winter, wind storm in summer and hot winds resulted in decreased growth rate and ultimately burning was reported.

For drinking purposes almost all the households were found to had installed water pumps at the depth of 20-30 ft all over the area visited.

One or two Hand-pumps were usually installed around residential quarters where all extended family members can use it. Severe brackish water was documented and experienced all over the area resulting in digestive disorders and renal burning especially among infants and elders. People knew little about water purification and cleaning techniques. Same water was used for cooking, bathing, washing and others operations. It was also told by many respondents that Diarrhea among children and other digestive disorders were common in animals mainly due to brackish usage of water.

3.5 SHIFTING SAND DUNES

Sand Dunes and ridges were largely seen in surveyed area of Desert. The communities were asked about the importance and negative/positive effect of living in a desert. The people told us nothing about their importance and positive role in their life style except “they enjoy sleeping on “tibbas” and feel comfortable in desert cool breeze at night time during hot summers. At the same time the unbearable temperature and living agonies were reported at day time”.

The major and frequent problem for farming communities was shifting sand dunes during heavy winds due to which soil erosion and sand dune de-stabilization is quite common. Their cultivable lands which is usually a small piece of land around dwellings becomes un-cultivable and to make this kind of land cultivable again extra resources are to be spent by the farmers for removing sands which ultimately affect their household economy and livelihood.

People were of the view that this phenomenon is common in two seasons in pre-harvesting and post-harvesting i.e. in March – May and in August and September. High speed

winds blow resulting in shifting of sand dunes, thus limiting human activity for minimum of few minutes to maximum of two to three days. The intensity and frequency varies over the time. As communicated by a group of people that 4-5 years back they had experienced heavy wind storms in late May resulting in loss of their precious livestock and household items. The standing crop damage was also reported as high speed wind storm shifted hot sand on almost all kind of crop leaves thus resulting in burning of said crops and vegetables. Since the shifted sand dunes, as stated above, requires mechanical activity in terms of ploughing and cleaning sand, most people reported borrowing money from different sources for managing the situation and keeping their lives going. The result was persistent

indebtedness, deteriorating household economy and increase in poverty.

When asked about mitigation and prevention strategies to minimize shifting of sand dunes and spreading of sand on standing crops, people answered that “tree plantation will minimize the intensity of shifting plus spreading of sand on crops”. But virtually it was practiced by negligible number of farmers. As cutting of

trees was seen faster than planting except one farmer who had very wisely erected shelter by growing a row of three types of trees i.e. *Khaggal, Shareen and Kiker* (acacia) on the field boundaries as wind breakers/shields which helped in stabilizing sand dunes.. He said that " he had no problem of protecting his crops on levelled land from shifting sand due to tree lanes erected around his fields rather he was earning rather extra money from sale of trees ."

As, such trees and shrubs were commonly used as fuel wood as well leading towards over cutting resulting in increased desertification and threat to bio-diversity. Particularly such trees also provided security to desert communities during drought. Therefore, more trees need to be planted to mitigate desertification and protect bio-diversity.

3.6 Wildlife, Flora Fauna and Bio-Diversity

The desert area prior to 1970, as reported by the people, used to be rich in wildlife, such as, deer, Houbara Bustard (*talor)* fox, jackals, parrots, wood-packers which now almost have become extinct or near to extinct. There used to be an abundance of deer roamed about freely in the area when human settlements and agricultural activities were very sparse. With the gradual settlements on newly allotted lands, vanishing habitats and excessive illegal hunting now the deer population has completely disappeared. The eco system has become very fragile due to disappearing of vegetation.

The communities told that " Hunting of Houbara Bustard is common these days and government has given greater relaxation to some groups of Middle Eastern countries thus resulting in depletion of this endangered species".

The only trees which grow in the desert include: Khaggal, Shareen, Acacia, Beri (Ziziphus Jajoba) and karir. While Beri and karir have almost become extinct. There were lots of medicinal plants reported to have in abundance which have also

disappeared except few weeds like Hermal and Kartuma which still grows in certain places. These medicinal plants were used for curing various

ailments. For example, Harmal -used in indigestion and digestive disorders and renal burning. Kartuma – its ash of dried burnt plant is mixed in honey and is used to treat wounds in animals and roots are used as purgative in acidities, jaundice and rheumatism. Dried fruit is ground into powder and then mixed with common salt and the preparation is given to cattle and camel in cases of rheumatism.

Another plant was seen little in some places. Its milky latex is applied on inflamed areas to relieve inflammation and on snakebite to neutralize poison. The leaves and flowers are crushed and the paste is mixed with honey to cure flatulence, anorexia, indigestion and intestinal worm infestation. The root powder is mixed with butter and this ointment is applied to rabid dog bite. The knowledge of using such plants is dying and needs documentation and recognition.

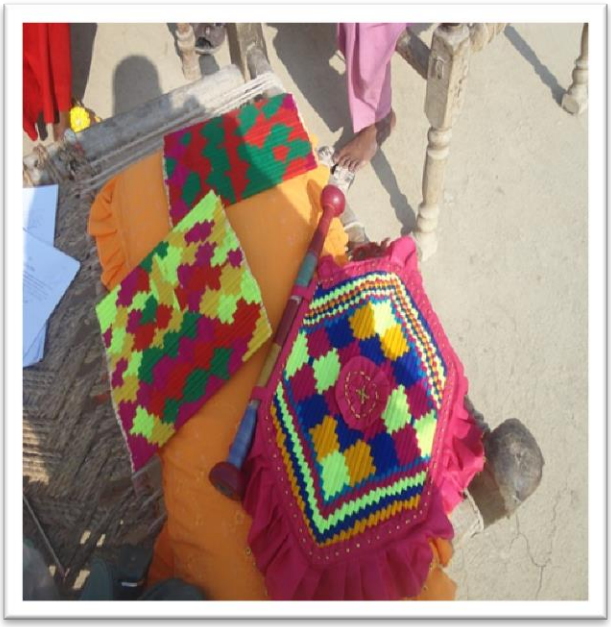
The local Khaggal tree which withstands harsh weather of desert was seen everywhere along with some Keekar (Acasia) and Beri . But Kareer which bears barriers like fruit used in making pickles and have medicinal properties, was seen very rare and will disappear soon. When asked from the people about this tree, they said that " nobody bothers anymore about this tree and pickle".

3.7 ROLE OF WOMEN IN DESERT ECOLOGY & ECONOMY

The role of women in agriculture production, food processing and their contribution in household economy cannot be ignored. Their role in

conservation of environment and bio-diversity is acknowledged and they are known as the 'custodian of bio-diversity'.

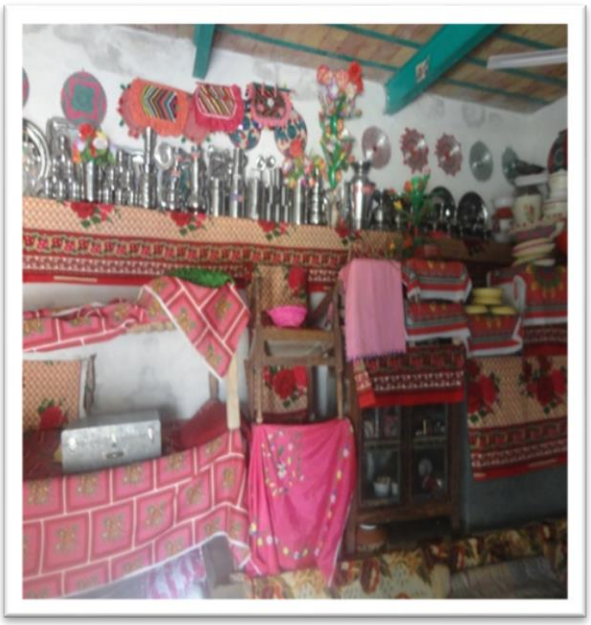
When interviewed and asked to record the role women plays in managing different tasks in



agriculture, it was observed that women play a pivotal and leading role in managing agricultural activities in the field as well as within the household in addition to their reproductive role in child bearing and rearing. Number of agricultural operations such as saving of seeds, grading of seeds, sowing and harvesting of crops, weeds management, straw saving, cutting of fodder for livestock and overall management of livestock (Feeding, Housing, Milking and Health management) were being carried by females yet their role is neither recognized nor documented both at local and national level.

Apart from contributing in farm activities and livestock management women also use their other skills for making various products from dates palm leaves largely for their domestic use. However, if women are provided training to enhance their skills they can make these products for the market fetching them reasonable return.

Rural women are particularly at risk from the effects of land degradation. Their livelihoods and responsibilities



make them more dependent on the local natural resources than men. The

constraints and pressures which they face leave them more vulnerable to declining crop yields, fuel wood shortages and deteriorating water supplies.

Literacy level among elder women was almost zero in all of surveyed communities with not even single literate women was matriculate mainly due to unavailability of schools. Secondly, women were more prone and vulnerable to health problems and especially related to maternity. The simple treatment and minor operation facility was available at 15 Km distance and somewhat good maternity center and Hospital at 50 Km distance. It further exacerbates the situation coupled with sandy paths and unavailability of sufficient financial resources and transportation facility.

3.8 CLIMATE CHANGE AND COPING STRATEGIES

Climatic changes now has become reality to a greater extent for the past few years as observations were shared by community members. The chickpea being a main source of income for small farmers and successful production entirely depends on rain fall, so people had understanding of rain patterns and frequencies and other climatic hazards over a period of some years. When asked about observation related to rain fall during the last fifteen years it was told by the people that chickpea production was great in the years from 1998- 2002, then for consecutive two years limited production was recorded and then again in 2005 production increased. However, after 2009 severe shortage in rainfall was observed and in 2011 production decreased a little bit. All reported changes were due to changes in frequency and timing of rain fall. It was also shared that in 2012, severe frost was seen in mid-February to late February and subsequently production decreased significantly. Rather in few places complete burning of crop was also observed along with all other vegetation i.e. fodder crops, wheat, trees, vegetables, shrubs etc. However, local Khaggal trees survived which become main source of income in such circumstances. In addition to that, it was also observed that expansion in summer season and increase of temperatures at nights

and their effects on livelihood was reported by farmers as marginal.

3.9 Effects of drought on the community

3.9.1 Shortage of Food and Fodder

Whenever, there was drought its effects were severe and manifested in the form of food shortages and scarcity of fodder for animals resulting in increase in prices. Some herders buy fodder from outside of Thal at very high price, others resort to migrate their cattle and livestock outside of Thal towards canal irrigated areas. Some of them also sell their animals due to lack of resources to feed them.

3.9.2 Drinking Water Scarcity

The water table goes down and some hand pumps even go dry and for drinking water people have to depend on water supply from faraway places near the irrigated areas.

As the water level goes down due to lack of recharge through rainfall the water quality also changes. Normally it turns more brackish and absolutely becomes unfit for human and animal consumption. People who keep on drinking this kind of water reported many water borne diseases. Such as, Gastroenteritis, cholera and other r related ailments.

3.9.3 Increase in Land Degradation and Desertification

If the drought persists for period long time the land is degraded which further add to the problem of desertification. Due to long history of drought in Thal, it is assumed that large part of its land is turning into desert incapable of raising agricultural produce or grasses for the animals.

3.9.4 Decrease in Agricultural Production

As agricultural produce is solely dependent on rainfall, the persistent droughts will drastically reduce the capacity of land to produce. In drought years the agricultural produce can be as low as 10% whereas in a good monsoon year it can be up to 60-70%.

3.9.5 Decrease in Animal Population

In drought time due to lack of fodder the animal become weak. They produce less meat and milk and hence its market value drastically reduces. Due to some exploitative practices, the owners of the animals are paid much less than the market value of animals. The in turn reduces the poor peoples' capacities to survive. They become more vulnerable as their animals fetch very low rates and they are forced to sell them at throw away prices to satisfy the basic food needs during the droughts.

3.9.6 Increase in Indebtedness

When people's resources deplete, they resort to informal channels for loans. They borrow from local money lenders from Arthia, shopkeepers and relatives to meet the survival needs. This borrowing has negative effects as the Arthia and shopkeeper lend money to the people at the interest rates which are many times higher than the bank rates. The other disadvantage is that in future when the people have harvest of their crops, most of the harvested grain is taken away by the Arthia and shopkeeper in payment of their loan. These exploitative practices of Arthia and shopkeepers further increase the vulnerability of the poor households who have no option but to depend on further loans which increase further their poverty.

3.9.7 Increase in malnutrition specially among women and children

Due to food shortages including animal products (milk, lassi, curd, meat) in drought times, the problem of malnourishment increases particularly in children. The pregnant women are particularly affected due to shortage of food. Undergo difficult delivery process due to their own physical weaknesses plus the infants born are of very low weight posing problem of survival. More than 90% of the poor households are severely affected due to the effects of drought.

3.9.8 Increase in infant and maternal mortality

The drought directly affects the health of mothers and their infants. Due to poor diet, long hours of work and social conditions the women become weak and anemic and give birth of weak infant. The survival of infants in many cases becomes difficult. The same is true for mothers who have to undergo very painful pregnancy and delivery period. Due to this situation, the infant and maternal mortality rates are normally high during the drought times.

3.9.9 Increase in the burden of women

During the drought the drinking water pumps become dry to the quality of water change for worse. In such situations the women have to walk long distances to fetch water from far away Pumps. Also during drought the head of the household is expected to migrate to canal irrigated areas in search of work in order to support his remaining family back in Thal. In the absence of the head of the household the entire family responsibility fall on the shoulders of women, which increases her burden of work? She virtually plays the role of her husband in his absence.

CHAPTER 4

Conclusion and Way Forward

From the findings of this study and analysis it appears that farming communities living in desert area face numerous challenges. But those specific problems which need immediate attention to improve their livelihoods in the changing climate would require working for sand dunes stabilization, harvesting of dew and conservation of water and, biodiversity and strengthen role of women in conservation practices at the household level as well at community level.

4.1 Sand Dunes Stabilization

The absence of investment in desert zones where shifting sand dunes is common contributes to the marginalization of communities and areas, rather it exacerbates further when un-favorable agro-climatic conditions are combined with an absence of anti-sand shields, particularly in Changing climate. To resolve these issue farmers need to be made aware of this menace and its consequences. The farmers would require to be motivated and encouraged to establish windbreaks and shelter belts to reduce the impact of water or wind erosion. Stabilizing or fixating the soil is often done through the use of shelter belts, woodlots and windbreaks. Windbreaks are made from trees and bushes and are used to reduce soil erosion and evapotranspiration. Due to arid climate, there is need to promote plantation of local shrubs, Acacia, *Khaggal and shareen* trees and water efficient sisal as wind breakers on the boundaries. If grown successfully these plants can help in stabilizing sand dunes and ultimately will contribute to improved livelihoods. The trees not only provide protection against shifting sand but also fix fertility in soil.

4.2 Dew Harvesting and Vegetable Production

In order to address major problem of scarcity of water there is need for conservation of this precious resource by increasing water use efficiency, rain water harvesting, reducing soil loss through increasing vegetative cover, encouraging dry land afforestation and promoting dry land farming. Dew harvesting technology has successfully been tested in Israel and India. However, in Pakistan it is not in our knowledge that it has been tested or not. Most probably not. It is a simple technology and can be tested as it helps in growing some vegetables in small tunnels which otherwise n is not possible to grow with brackish water. The vegetables, particularly creepers like kerela and Tori (bitter gourd & squashes) can be grown which would provide food security as well as save money otherwise spent on buying vegetables from the market. Dew harvesting with mulching on minor crops can help in keeping the moist intact for positive impact.

4.3 Promoting Energy Conservation

Women of household use fuel wood of Khaggal trees and some dry bushes but their cook stoves waste enormous energy which can be saved upto 30 % if fuel efficient stoves are introduces.

Similarly, most people use kerosene oil for night lighting which emits Carbon and is major health hazard particularly for women and children who are most exposed. It also cost them around Rs.800=1000 per month per households. In order to stop this emission a very simple and low cost portable solar light with provision for mobile charges is needed to be introduced. This would not only save their money but also help women who usually go out of their houses at night time for the call of nature and exposed to snake bites.

Furthermore following intervention may help in improving livelihoods of desert communities:

- Establishment of Chickpea Growers Association for relieving farmers from the clutches of traders and indebtedness.
- Community preparedness programme regarding climate change and adaptation.
- Efficient water harvesting and usage practices need to be introduced extensively.

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