



## **Droughts and Floods – A Study on Community Coping Strategies in Dry land Areas of Balochistan**



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## 1. Preamble and Rationale

Balochistan is the largest of Pakistan's four provinces, but due to harsh climatic and topographic conditions is also the least populous, the most under-industrialized and with the lowest Human Development Indicators. The climatic conditions in the dry land areas including Chagai and Kharan districts are extreme with the ratio of average annual precipitation to evaporation reaching extremely low values of under 0.05<sup>1</sup>. Besides, the rugged and varied topography with denuded watersheds creates an extremely fragile environment with frequent droughts and occasional flash floods causing land degradation and making poverty rampant in these areas where the livelihoods depend very much on agriculture and livestock – both extremely susceptible to the negative impacts of droughts and floods.



Among the natural resources available to the inhabitants in the immediate physical environment, rangelands qualify as the most important in terms of provision of livelihoods through livestock rearing, which remains the main economic activity. With incidences of droughts and floods, the already overgrazed and overstocked rangelands providing the only feeding ground to the livestock become further degraded and fail to support the major economic activity of livestock rearing. Thus, under these fragile conditions, both droughts and floods remain areas of concern whenever economic well-being or livelihood concerns are addressed.

While overall water scarcity remains prevalent, the area has also experienced extreme weather conditions in recent history with sudden high intensity rains and long periods of no rains<sup>2</sup>. The extended 7-year drought from 1998 to 2004, which saw an 80% reduction in the already meagre average rainfall of 100 mm in the area<sup>3</sup> (Pakistan Meteorological Department Data) contributed largely to increased poverty with over 80 percent of the livestock perishing (various reports by UNDP, Islamic Relief, Concern Worldwide). The recent flash floods, due to unprecedented heavy high-intensity rainfalls averaging over 400 mm in couple of months, played havoc with life, public infrastructure and private property. The extent of damage to agricultural lands has been large, as big chunks of fertile land were totally washed away or eroded beyond repairs. Vulnerable communities in the area continue to face the problems of access to adequate and safe drinking water with women travelling long distances to bring a few pitchers of water on their heads or on animal backs to meet domestic needs.

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<sup>1</sup> Evaporation and Evapo-retardants, Study by Irrigation, drainage and Flood Control Research Council

<sup>2</sup> Various reports on floods and droughts in Balochistan from Internet

<sup>3</sup> Climatic data from Pakistan Meteorological Department

The twin problems of land degradation and poverty in the areas are further compounded by the incongruent social, political and economic structures prevalent in Balochistan. With historical traditions of nomadic practices and communal property rights, the province is still developing adequate social institutions that can deal with the transition towards modernity. Rangelands may have been efficiently managed by particular social institutional arrangements in the past but as the pressures on the rangelands have increased, the traditional management practices may have lost their effectiveness<sup>4</sup>. Moreover, through the process of modernization, the age-old social institutions have either collapsed or have become redundant, without a corresponding development of modern management institutions, leading to aggravated environmental degradation.

There is also a social-class component to the issues of drought and floods, environmental degradation, increased vulnerability and lower livelihoods levels. The non-poor may have exit options, which are not available to the poorest strata of society. Over time, the poorest of the poor face not only dwindling real capital but also lower indicators of human and social capital. Theory tells us that when 'an extreme event' like flood or drought occurs, communities (both poor and non-poor)



react to it through various coping strategies. While rich households may have many exit options or alternatives, the poor households have to put up with miserable conditions.

There is no denying the fact that the relationship between human beings and the natural environment is a complex one with many interdependent factors. Arguing that human poverty is a pivotal factor behind environmental degradation, past researchers have squarely blamed the poorest and most vulnerable arguing these sectors of our society have a greater dependence upon the environment as a source of livelihood and sustenance. Termed as the 'downward spiral', the vicious cycle



between poverty and environmental degradation has been the foundation upon which much socio-economic philosophy of the past was based. With other sources of income almost non-existent in the harsh dry land areas of the district, the communities have come to rely heavily on land resources to provide them with food

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<sup>4</sup> Climate Change in Politics of Economic Relations, PhD

through rain-fed (rainwater harvested) small scale highly vulnerable agriculture activity barely sufficient for sustenance.

Recent experience from work on similar dry land areas in the world, however, shows an altogether different reality. The interdependence of poverty and environment cannot be seen as a simple cause-effect relationship. Research indicates that the Poverty-Environment nexus is highly complicated and difficult to generalize. Factors such as local conditions – property rights structures, stage of economic development, demographic status etc. – all need to be taken into account to determine the relationship between poverty and environment.

This study has been undertaken with a focused analysis of the causes and effects of various issues confronted by the local communities and how they are trying to cope with the same and how they same could be resolved through technological innovations. The major issues include loss of vegetative cover in the watersheds and rangelands due to overgrazing and meeting energy need of local and nomadic population, soil loss and reduction in fertility due to erosion, and limited water availability and quality for domestic, agricultural and other requirements.

## **2. Study Objectives**

The study has been undertaken with the following objectives:

- i. Determine how communities meet their water requirements and manage local rangelands and watersheds so that they retain their productive potential;
- ii. Describe the physical and financial impacts of droughts and floods on households and the traditional and improved impact coping strategies against floods and droughts;
- iii. Determine whether communities try to make collective coping efforts to deal with the vagaries of climate impacts and if so describe the results of such efforts; and,
- iv. Determine the results of various interventions, if any, undertaken by different agencies.

## **3. Methodology Adopted**

As dictated by the objectives of the study, a methodology has been adopted to help undertake a focused analysis of the causes and effect of various issues confronted by the local communities and how they are trying to cope with the same. Necessary information has been gathered from a limited number of communities through a well organized questionnaire to determine the impacts of droughts and floods on rangelands and livelihood patterns in the dry land areas of Kharan District. An insight was also obtained to find out how to resolve the issues through technological innovations

The following steps were undertaken to help complete the study:

### 3.1 Selection of Villages and Households

A preliminary reconnaissance survey spanning over a time period of 15 days was conducted to find out villages fulfilling the basic criterion of 'most affected by floods and droughts' in Kharan. As a result of this survey and discussion with relief organizations active in the district, 11 villages of various sizes were identified in 5 union councils of District Kharan. The number of households in these villages ranged from 20 to 500. As per ToRs of the



study, best efforts were made to conduct the survey among 15% households in each village. However, it was found during initial reconnaissance survey that some villages were either too small (20-30 households) while some were very large (over 300 households), which made the condition of surveying 15% households difficult to achieve within the available resources and time. Further it was also revealed that the larger villages were scattered in clusters and were not integrated. It was, therefore considered more appropriate to survey only the worst affected clusters of villages to represent the bigger community of the large village. The size of village/cluster for survey was limited to a maximum of 50 households so that 7 to 8 households were interviewed within one village/cluster. For smaller villages again the number of households surveyed was kept at the same figure so as to give adequate representation to the income wise diverse kind of households in a particular village.

### 3.2 Primary and Secondary data and Sources

Primary data were collected through a field survey of villages using a specially designed questionnaire. The questionnaire was designed to help understand and gauge people's perception of natural disasters in particular, floods and droughts, and how they are coping with the increased frequency of these natural disasters. A copy of the questionnaire is given at Annex-1. Efforts were also made to conduct household surveys preferably among three income groups – the rich, the middle class and the poor among different villages, who were identified during the reconnaissance survey – in each selected village. No set and across-the-board criteria could be applied for distinguishing between the rich, middle and poor classes of the population in each village because of the vast difference in the standards applicable to assessing the economic status of households seen in the different villages, which necessitated that the criteria be based on relative household incomes in individual village.

It was decided to interview the village households on random basis among the three classes so as to avoid any biases. Efforts were made to conduct face to face interviews with the head of the household; however, where he was not available, interviews were held with the person most senior after him. The secondary data consisted of published and unpublished reports and data on floods and droughts, current water management practices, climate change

evidence and current scenarios, etc., which were collected from different sources and made use of in the compilation of this report.

### **3.3 Primary and Secondary Data Analysis**

Keeping the objectives of the study in view, the collected literature, information and primary data were carefully studied and analyzed to help arrive at conclusions and formulate recommendations.

### **3.4 Report writing**

The initial draft of the report was prepared and discussed with a small group of relevant stakeholders at the grass root level in the study area and at the provincial headquarter level in Balochistan and their suggestions were incorporated in the final report. These stakeholders included the Islamic Relief Organization field unit in Kharan, officials of government departments of Irrigation, Public Health Engineering, Local and District governments, etc.

## **4. The Study Area**

Balochistan is the most marginalized province of Pakistan with 44% of the total land area of Pakistan. The province is marked by high rate of poverty, illiteracy, unemployment, and infant and maternal mortality. The Human Development Index (HDI), which is the best known measure of development based on (a) life expectancy at birth, (b) adult literacy rate, and (c) per capita Gross Domestic Product (GDP), varies greatly among Pakistan's different provinces and districts. The literacy rate varies from 51% in Sindh to 36% in Balochistan. Among the top 31 districts with the highest HDI, Punjab has by far the largest share at 59% against 9% for Balochistan. Sindh has 13% share while NWFP is at 19%. On the development deprivation front, Social Policy and Development Centre classifies 92% of Balochistan districts as "high deprivation" districts against 50% in Sindh and 29% in Punjab.

Under conditions of: arid to hyper-arid climatic patterns; water scarcity, depleting aquifers, poor watershed conditions, varied physiography consisting of coastal areas, deserts, uplands, and plains; rampant poverty; subsistence oriented agriculture; and, frequent incidents of droughts and floods, it has all the essential ingredients to qualify as the most vulnerable province as far as climate change is concerned. Already the province has passed, not too long ago, through a long and persistent drought, which extended to well over 7 years from 1998 to 2004 resulting in extensive loss of life and property. The same was followed by severe floods, which besides causing death and misery to thousands of people disrupted communication infrastructure.

District Kharan is situated in northwest Balochistan. The total District area is 48,051 sq Km<sup>5</sup>, (13.84 % of the total area of Balochistan), and is divided into the Tehsils of Kharan, Basima, Mashkel, and Nag. It is bounded by Chagai in the north and Kalat in the east while towards the south is Washuk district. The population density of the

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<sup>5</sup> Wikipedia – the Free Encyclopedia form the Internet

district is very low and Kharan City is the only urban centre there, while 80-85% of the population lives in the rural areas.

With a population density of barely 4 persons per square kilometre, the total current population is estimated at 0.28 million people with Rakhshani and Hasni as the principal tribes. The literacy rate in urban areas is estimated at 32.5 while in the rural areas it is as low as 12.5, Most (Over 95%) of the houses are kaccha (mud) or semi-pacca.

Agriculture provides the major source of livelihood in the district. Like in most other adjoining districts e.g. Panjgur, Awaran, Khuzdar, and Chagai, wheat is the principal crop in the district while a variety of fruits is also grown. Livestock and camel breeding is the second most important sector in the district. Rug making is also popular in the district. Overall the development indicators of the district are rather poor. Electricity was provided to the district as late as 1991.

The major issues of the district as identified during the survey include loss of vegetative cover in the watersheds and rangelands due to overgrazing and meeting energy needs of local and nomadic population, soil loss and reduction in fertility due to wind and water erosion, and limited water availability and poor quality for domestic, agricultural and other requirements. While agriculture is mostly subsistence oriented in the study area using the highly variable rainfall dependent *sailaba* and *khushkaba* forms of agricultural practices, water for domestic purposes is either groundwater or is mostly brought from great distances by women on their heads or on animal backs or, where communities can afford, in bowsers pulled by tractors.

Incidences of drought have been a common feature in the area due to its hyper arid natural climate and have taken a heavy toll of livestock and crops during 1998-2004. Besides floods have played their active part in recent times. The union councils which were badly affected in the last floods in 2006-07 were Kharan North City, Kharan South City, Jodai Kalat, Jamak and Tomulk, Raskoh and Sarawan. These last five union councils were selected to constitute the area for conducting household surveys under the study to get local residents' feedback on the drought and floods, in particular the drought phenomena, which has a far greater occurrence potential in the fragile environmental and livelihood situation in Balochistan.

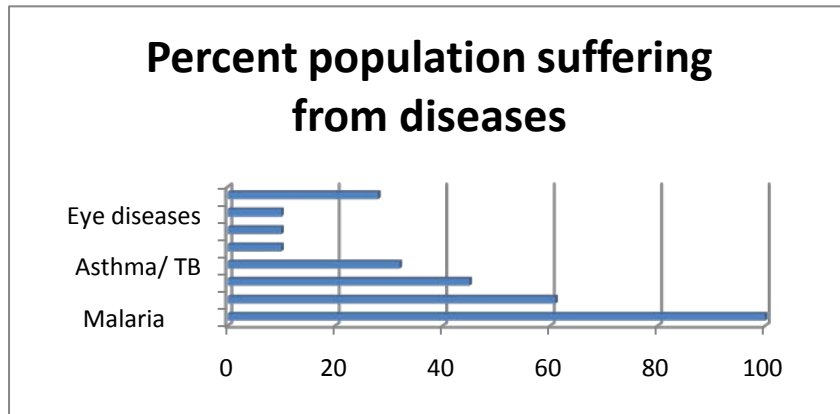
## **5. Household Survey and Responses**

Household survey to get response to questionnaire was undertaken in the following eleven villages covering five union Councils of Kharan District:

- i. Killi Khair Muhammad Jangal – Union Council Jamak
- ii. Killi Alam Khan Jangal – Union Council Jamak
- iii. Killi Gazi – Union Council Jamak
- iv. Killi Zayam – Union Council Jamak
- v. Killi Haji Dost Muhammad Pathan – Union Council Sarwan
- vi. Killi M. Khair Padin – Union Council Sarwan



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100	61	45	32	10	10	10	28



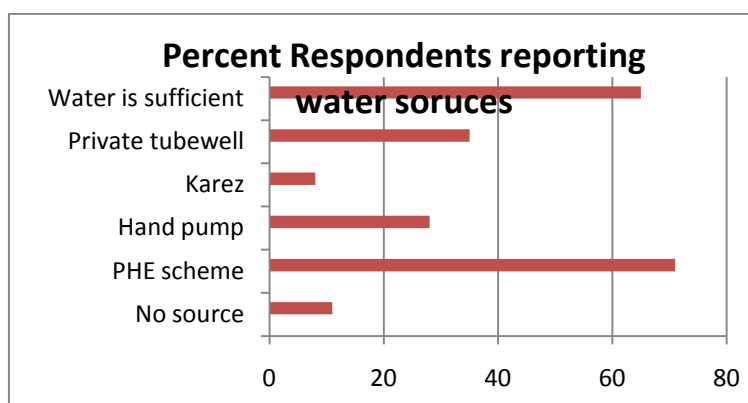
As can be seen water borne diseases like Malaria and diarrhoea are the most common diseases showing problems with water quality particularly in the absence of any waste disposal system. Even in villages where water supplies are met from public health outlets/tubewells the incidence of such diseases are very common. An interesting observation made is that skin diseases are common in 50% villages of Jodai Kalat union council; there was no incidence of this disease in any of the other villages or union council. Similarly eye diseases are common in 50% villages of Tohmulk union council, while other areas have not reported this disease. This needs further investigations to determine the causes of this particular behaviour.

#### 5.4 Water sources and water table behaviour

Table 3 gives an insight into the water sources, its quality and its adequacy to meet different requirements. The following is brief of various sources of water and means to tap, and the declination in water table behaviour as observed over the last 15 years.

Percent respondents reporting

No source	PHE scheme	Hand pump	Karez	Private tube well	Water is sufficient	Water table declination in 15 years (feet)			
						<15	15-30	30-45	>45
11	71	28	8	35	65	29	20	20	30



The greatest drop in water table (50-60 feet) has been observed to be in Union Council Jodai Kalat where tubewells have been installed both in the private and public sector. This is followed by Union Council Sarawan where the reported drop in villages having tubewells is 55 feet but in villages having no tubewells the drop is reported to be less than 8 feet. Similarly in Tohmulk Union Council, where the reported drop is 20 to 40 feet, all villages have tubewells. Surprisingly however, in Union Council Raskoh, despite having tubewells in the private/public sector, the drop has been less than 10 feet in the same period indicating good aquifer recharge. Of particular interest is the finding during the survey that water table in the Raskoh Union Council had dropped by almost 25 feet during the 7-year long drought period. Apparently this water table has very quickly recouped itself by 15 feet in the short flood season. As per survey the absolute declination has thus been only 10 feet, which is remarkable. I think the reason for this is that Raskoh lies in comparatively high precipitation zone.

Regarding adequacy of water to meet agricultural requirements, 31% of respondents reported that water was sufficient to meet their requirements while the rest 69% reported that water was not sufficient. Those saying that water is sufficient, apparently, have come to adjust their needs according to the availability of water. Union council wise 100% of respondents reported sufficient water in Raskoh Union Council, where water table is still well within reach of farmers as stated in previous paragraph. In other Union Councils the reaction was observed to be mixed with overall average water tables going down despite the flooding season.

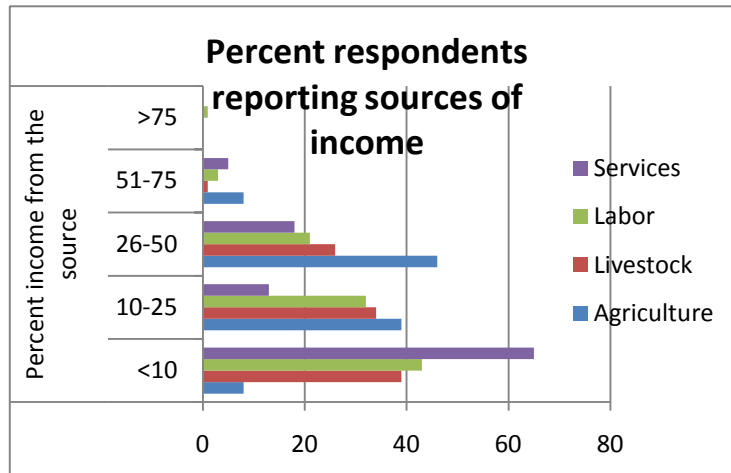
## 5.5 Sources of Income

As is the general pattern in Balochistan, agriculture and livestock sectors provide the bulk of income to all the communities in the surveyed villages in Kharan District. This is followed by labour and services sectors as can be seen from the summary report below.

Percent respondent reporting

Source of Income	Percent income from the source				
	<10	10-25	26-50	51-75	>75
Agriculture	8	39	46	8	0

Livestock	39	34	26	1	
Labour	43	32	21	3	1
Services	65	13	18	5	0



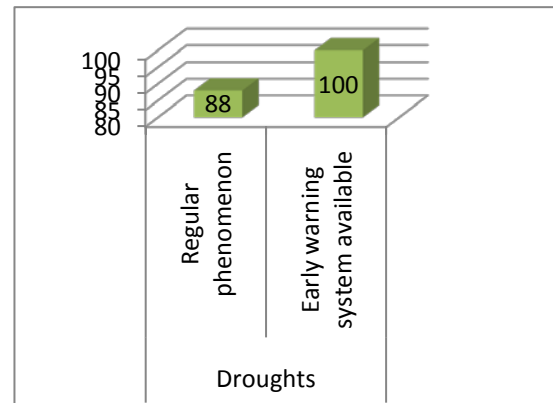
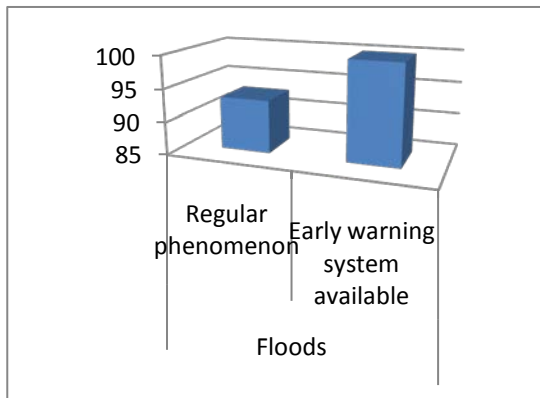
This is in line with the general tradition of income pattern for the rural population in rural Balochistan. A very important and crucial aspect however that can be seen from the above summary table is that dependence on livestock activity, the traditionally strong income source in Balochistan, is showing signs of declination with tendency towards labour and services sector. This is easily explained by the fact that the continued scarcity of water resources and the prolonged drought that hit the province from 1998 to 2004.

## 5.6 Occurrence of Natural Disasters (Floods and Droughts)

Each household was asked to comment on the occurrence of both kinds of natural disasters i.e. floods and drought as regular phenomena and whether any kind of early warning system existed in their area or not and what kind of adaptation measures they took. Following is the summary of the responses the survey team got:

Percent respondents reporting

Floods		Droughts	
Regular phenomenon	Early warning system available	Regular phenomenon	Early warning system available
93	100	88	100



It is pointed out that those saying no to the floods/droughts as a regular phenomenon were agreed that these natural disasters are not regular but do happen off and on. Those saying yes to the question were not sure of the frequency of the phenomenon. It is therefore apparent that both droughts and floods occur in the district but its frequency as a regular feature is questionable. Despite the responses, it can be assumed that these natural disasters are not regular. All respondents, however, agreed that there was no early warning system in their area which could warn them of the impending natural disaster so that they could take appropriate advance necessary measures. It is only when the event is there when they realize the gravity and start taking steps to ensure their and their property's safety but by that time it is generally too late.

### 5.7 Losses suffered and Coping Strategies

Losses due to floods can be broadly classified under four major heads. These are losses to property (houses and living quarters), crops, livestock, and agricultural lands. Losses due to droughts are classified under two heads; of losses to crops and losses to livestock.

Following is a summary of responses received on losses due to the two natural disasters viz. floods and droughts that recently occurred in the area:

Percent respondents reporting

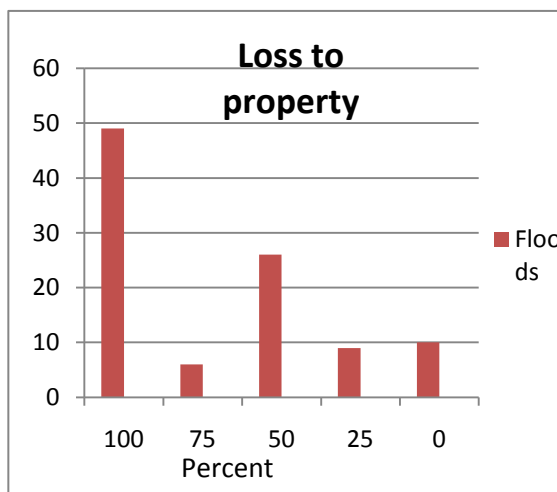
Loss to Property		
	Losses due to Floods	Losses due to Drought
100%	49	-
75%	6	-
50%	26	-
25%	9	-
0%	10	-

Loss to Animals		
	Losses due to Floods	Losses due to Drought
100%	12	65
75%	3	8
50%	26	15
25%	15	6
0%	44	6

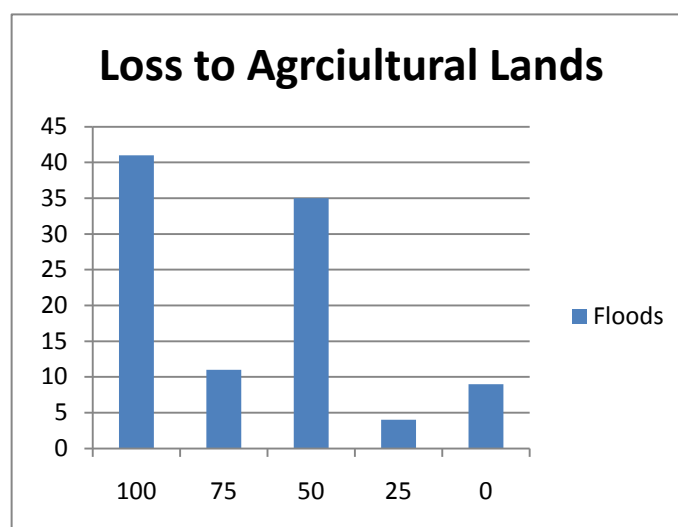
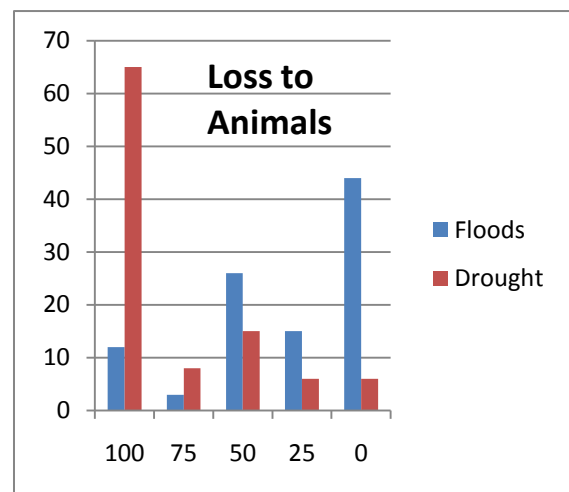
Loss to Crops		
	Losses due to Floods	Losses due to Drought
100%	51	82
75%	3	2
50%	24	8
25%	4	0
0%	18	8

Loss to Agricultural Lands		
	Losses due to Floods	Losses due to Drought
100%	41	-
75%	11	-
50%	35	-
25%	4	-
0%	9	-

The most damage inflicted has been to property during floods when houses owned by people were washed away or good agricultural lands were eroded. It can be seen that a large number of respondents have reported zero damage to livestock. This is a misnomer, as this includes a large number of respondents whose livelihood was never dependent on livestock. Drought has been the major cause of losses to crops and livestock in the area. Hundred percent crop losses have been reported by a vast majority of respondents exceeding 80%. Similarly the 100% loss to livestock is reported by 65% of respondents. This is obvious and more understandable considering the condition of watersheds and rangelands in the district whose climate is arid to hyper arid. They are in a very degraded state and unable to support large number of livestock. This also confirms the discussion in Section 5.5 under income sources, where similar trend has been observed.



respondents reporting

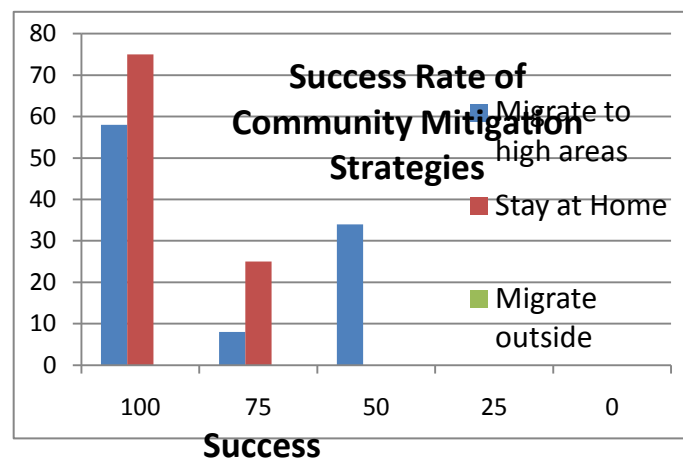


## 5.8 Community Coping Practices

The survey questionnaire had included questions on how communities cope with floods and droughts and what, in their opinion, has been the success rate of these practices. Following summary table provides the responses received from the household members by the survey team.

Percent respondents reporting

Floods						Droughts					
Mitigation Measure	Success Rate					Mitigation Measure	Success Rate				
	100	75	50	25	0		100	75	50	25	0
Move to high areas	58	8	34	0	0	Move to high areas	-	-	-	-	-
Stay at home	75	25	0	0	0	Stay at home	0	0	3	1	96
Migrate outside	-	-	-	-	-	Migrate outside	-	-	-	-	-



While moving to higher grounds during floods is the only practice followed by the local communities in the area, nothing has been done by other communities during droughts. Migration to other areas has not been indicated by any of the respondent. Only 58 percent of those opting for moving to high areas during floods have stated that the move was 100% successful. While 34 percent stated that the move was 50% successful. Only 4 respondents opted for staying at home and 3 of them stated the measure to be 100% successful but their homes were already located at slightly higher grounds.

Under drought scenario, 100% of the respondents opted to stay at home but 96% of them termed the practice 0% successful. It becomes apparent that drought is the major natural calamity with which the communities have to deal with and there are little options with them to cope with this kind of disaster.

## 5.9 Government/NGO Efforts and its success

While instances of getting help during flooding season through some NGOs have been reported by some of the respondents, in droughts very little material help has been received by communities in the study area. Only 3 (3.75%) respondents (two from Sarawan Union Council and one from Jamak Union Council) reported that aid was received from the government during the drought in the form of fodder for animals but this was hardly adequate and could meet only 25% of requirements. One (1-25%) respondent (from Raskoh Union Council) received from International Islamic Relief Organization (an NGO) a wind powered pump, a solar powered pump, a hand pump and some fodder for livestock. The move was described by the respondent as 50% successful.

## 6. Review of Coping Strategies

Determining the relationship between poverty and the environment, to design cogent policy prescriptions, is also an integral part of the Balochistan Conservation Strategy (BCS) by IUCN Pakistan and the Pakistan Participatory Poverty Assessment – Balochistan Report (PPPA-BP). The PPPA-BP writes:

“Although the drought has been persistent over several years, the effects such as livestock deaths, crop failure and water shortages are major shocks to people ... intake of meat and milk has fallen drastically ... diseases have increased and, in particular, children’s health has deteriorated ... animal by-products [used to make handicrafts] have decreased and a vital source of income has declined. [In addition] falling agricultural employment has led to lower incomes and an increase in loans and these debts keep increasing ...”

Both policy documents propose poverty alleviation strategies that hinge upon the regeneration of environmentally degraded rangelands. The twin problems of degradation and poverty are perhaps further compounded by incongruent social, political and economic structures. With a historical tradition of nomadic practices and communal property rights, Balochistan is still developing adequate social institutions that can deal with the transition towards modernity. Rangelands may have been efficiently managed by particular social institutional arrangements in the past. However, through the process of modernization the age-old social institutions have either collapsed or have become redundant, without a corresponding development of modern management institutions, leading to aggravated environmental degradation.

In spite of the past history of droughts and dry cycles, rural communities have not yet developed institutions that can cope with drought and other such natural calamities. Some change has been witnessed as households in the study sites have indicated the presence of some collective strategy to cope with droughts as a regular phenomenon. Collective strategies are generally easier to create amongst small, well-knit communities with clear incentives to collude and cooperate. Given such a nature, collective strategies tend to be easier to develop amongst high-income households. The poor may lack anything from the necessary capital, time, resources etc. to be able to collude and cooperate.

Because of historically extreme climatic conditions in Balochistan, most communities are used to vagaries of nature (droughts and floods) in different ways and have been

taking appropriate adaptive/preventive measures. These include moving to other settled areas in search of alternate livelihoods and where the climate is more favourable, selling their assets and livestock, moving to more settled areas with greater and more assured water availability. Such measures being of short term and unsustainable nature would not be of help in the future climate change scenarios due to the sheer severity and nature of the impacts. It is therefore necessary to suggest better and more practical adaptation strategies and policy guidelines not only for communities but for government as well.

The last drought in Balochistan has seriously affected livestock and agriculture productivity, the main livelihoods sources of rural communities in Balochistan. Severity of drought, however, varied from region to region. Kharan district already is extremely dry area with hyper arid climate and is more vulnerable to drought and its impacts. Environmental conditions especially the amount and pattern of rainfall, vegetation type and presence of natural resources played a key role not only in sustaining the communities during drought but also in the afterward recovery in the district. Vegetation type and presence of other natural resources in these areas provided critical resources to the communities for survival during drought. Vegetation type played a very prominent role in rehabilitation of communities, particularly in those areas where communities were heavily dependent upon rangelands/livestock for livelihoods.

It is evident that poor households in the communities were more affected than middle income and rich. The reason for their vulnerability to drought and other such events was the low diversification of livelihood sources particularly agriculture and livestock. Most of the poor household members are engaged in daily wage labour, raising some animals (sheep and goats), cultivating their own rain fed land or sharing crop with other landlord in irrigated or rain fed agriculture. Very few of them base livelihood on government services and business. Drought has affected most of these livelihood sources of poor households and further pushed them down the poverty line.

Government agencies have been grossly ineffective in providing the necessary support during the crisis days, which may be due to general apathy and its inefficiency and lack of infrastructure and sustainable institutional support in the harsh conditions. The NGO sector has also been criminally neglectful both during the drought and floods with little evidence of any support or relief.

## **7. Recommendations**

As a result of the survey conducted, interactions made with some stakeholders at the government and civil society level active in the area, the following immediate, medium, and long term strategic and policy level recommendations are made for implementation by various responsible agencies.

### **7.1 Immediate Implementation (1 to 5 Years)**

- i. Management practices of existing resources in the physical environment should be strengthened to ensure their sustainable use. This can be carried out by the activities of Government and civil society actors, examples of such activities can be check structures,

rehabilitation of Karezes where feasible, watershed management, improved bandaat systems for Khushkaba, etc. who should immediately start playing a more proactive role in meeting the crises. **(Action by Civil Society and departments of local government, public health, forest, agriculture, livestock. and irrigation).**

- ii. Regulatory measures need to be undertaken on an urgent basis to control the mining and pollution of groundwater resource, which is likely to increase in many aquifers as a result of climate change. It is worth mentioning that this is a resource on which users usually have full control and as such is more dependable source of water during periods of water shortage.

## **7.2 Medium Term (6 to 10 Years)**

- i. Access to credit must be made easier through appropriate measures. Currently, the poorest find formal lending agencies inaccessible or the terms too harsh to suit their payback capacity. This results in them relying on traditionally exorbitant lending sources such as shopkeepers, local influential people, and professional lenders. In the case of both floods and drought, where the poor were unable to repay these debts, they have been forced to dispose of their valuable assets and have sunk deeper into poverty.
- ii. Provision of basic health care facilities at subsidized rates at the village level should be ensured. Similarly advanced facilities at Union Council level need to be provided. It must be understood that human resource and labour are the two most important assets of the rural poor and thus any health issue not only drains existing meagre assets but also affects future income opportunities.
- iii. Social organizations and institutions present in the rural communities should be revived, strengthened through social mobilization and human resource development, and most importantly taught modern management techniques.
- iv. In case of poor access to regular supplies of surface and groundwater, greater dependence on rainwater harvesting technologies is another adaptive option available. Traditional *khushkaba* and *sailaba* systems of farming should be made more systematic and scientific based for maximizing results and productive output from the available potential in the dry land areas.
- v. There is need to educate the communities on grazing management on scientific lines. The traditional systems of grazing management should be promoted and encouraged.
- vi. Effectively run mass awareness campaigns using both print and electronic media – in particular the radio having greater access to backward and far flung areas – should be launched to make the community of water users in the dry land areas aware of latest technologies. Similarly demonstration projects need to be installed

besides arranging exposure visits and sending mobile teams to various dry land areas to mobilize the local communities and raise their understanding and awareness about water conservation. This will help in:

- a. Identifying, promoting, and applying appropriate location specific and crop specific efficient water conveyance (lining of channels and pipes) and field application technologies (trickle, sprinkler, bed and furrow, land levelling, etc.) technologies.
- b. Adjusting the timing of irrigation to take into consideration the high evaporation rates during day time.
- c. Changes in cropping patterns replacing high delta crops with low delta crops to save on water by reducing demands.
- d. Bringing about behavioural changes in use of water for both agriculture and domestic purposes to help mitigate the impact of water scarcity to a large extent.
- e. Means to provide supplementary fodder at critical times to provide enough time to natural rangelands to regenerate and recoup their grazing potential should be explored.
- f. Promote good individual and community sanitation and personal hygienic practices.
- g. Promoting the concept of reusing grey water. This can help in reducing demands on the freshwater resources for domestic use particularly in toilets and irrigating lawns or for kitchen gardening.

### **7.3 Long Term (Over 10 Years)**

- i. Emphasis should be placed on developing the valuable human capital in the dry land areas of Balochistan through extensive educational and vocational training programmes aimed at increasing local peoples' skill levels to change over from traditional income sources to other sources.
- ii. Access to markets should be made easier. Many of Balochistan's traditional industries e.g. embroidery, may be able to supplement household income but have not yet been able to do so primarily because markets are hard to access especially in large cities. Formal or informal institutions should be created that are able to transport these goods to markets. This would also serve to diversify the poor's portfolio of income generation opportunities.
- iii. The impacts of droughts can be largely mitigated if adequate water storage reservoirs are created in each village or cluster. These reservoirs should be designed in a way to reduce the losses due to evaporation that may occur as a result of extremely dry climate prevailing in the area. In case of harnessing groundwater storage, pumping by using wind power or solar power need to be investigated in areas where water table is not too deep, as energy costs are

increasing and using electricity or fossil fuels may not be justified. These reservoirs can be filled during water excess time like floods so that water is available during the relatively water slack periods or droughts. The reservoirs need to be complemented with filtration and disinfection facilities so that the people have access to potable water free from bacteria and suspended harmful materials.

- iv. Communities in Balochistan meet almost 75% of their fuel wood and energy needs from rangelands. Providing alternate energy sources (solar, wind, gas, etc.) would alleviate this problem to some extent.

**Table 1: Surveyed village details**

	Village/Union Council	Infrastructure facility available	House holds/ Popula tion	Health facilitie s	Schools	Solid waste/ sewage system	Water source	Source Protection against floods	Agricultural lands	Remarks
1	Killi Khair Muhammad Jangal/Jamak	No	20/140	No	One boys primary	No	1 tube well	Protection wall (unreliable)	Khushkaba Sailaba Irrigated	Regular floods/ Drought
2	Killi Alam Khan Jangal/ Jamak	No	20/140	No	No	No	1 tubewell	No protection wall	Khushkaba	
3	Killi Gazi/Jamak	Electricity, Loop	150/1050	One Hospital	One Boy Middle One Girls Primary	No	1 tubewell	No protection wall	Khushkaba, Sailaba, Irrigated	
4	Killi Zayam/Jamak	Loop	450/3150	No	One Boy Middle One Girls Primary	No	1 tubewell	No protection wall	Khushkaba Sailaba	
5	Killi Haji Dost Muhammad Pathan/Sarwan	Access Road	67/469	No	No	No	2 Tubewells	Nil	Khushkaba, Sailaba and Irrigated	
6	Killi M. Khair Padin/Sarwan	Access Road	26/182	No	One Boys Primary	No	2 Tubewells	Protection Wall	Khushkaba	
7	Killi Shayan/Jodai Kalat	Elec. & Telephone	201/1407	No	One Boys Primary One Girls Primary	No	1 Tubewell	Nil	Khushkaba and Sailaba	
8	Killi Gozaggi/Jodai Kalat	Elec. & Loop Tele	35/245	No	One Boys Primary One Girls Middle	No	Nil	Nil	Khushkaba and Sailaba	
9	Killi Raza Muhammad Godano/Tohmmulk	Elec.	70/0	No	No	No	1 tubewell	Nil	Khushkaba and Irrigated	
10	Killi Ghulam Yaseen/ Tohmulk	No	25/175	No	No	No	1 Tubewell	Nil	Khushkaba	
11	Killi Eri Kalag/Raskoh	Loop	500/3500	One Disp.	One Boys Middle One Girl Primary	No	Nil	Nil	Khushkaba Sailaba and Irrigated	

**Table 2: Basic information of households**

S. No.	Village	Household Head/Interviewee name	No. of persons in household	Type of house (Kachha/Pukka)	Utilities	Waste disposal practice	Sanitation facilities/practice	Most common diseases	Remarks
1	Killi Khair Muhammad Jangal/Jamak	Khair Muhammad/Abdul Malik (Son)	14	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough, Loose Motions	
2	Killi Khair Muhammad Jangal/Jamak	M. Goush/Ghulam Nabi (Son)	13	Kaccha	No (Wood)	Throw out	Open Area	Malaria, Cough	
3	Killi Khair Muhammad Jangal/Jamak	Gul Muhammad	8	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Asthama, TB	
4	Killi Khair Muhammad Jangal/Jamak	Abdul Mutalib	8	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Asthma, TB	
5	Killi Khair Muhammad Jangal/Jamak	Habib Ahmad	8	Kaccha	No (Wood)	Nil	Fire	Malaria, Cough Flue, Asthama, TB	
6	Killi Khair Muhammad Jangal/Jamak	Khareem Bux	6	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Flue, Asthma	
7	Killi Khair Muhammad Jangal/Jamak	M. Arif	2	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Flue, Asthma	
8	Killi Khair Muhammad Jangal/Jamak	Khalil Ahmed	4	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Flue	
9	Killi Gazi/Jamak	Sabir Ali (Head)	11	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
10	Killi Gazi/Jamak	Haji Elli Buksh/M. Kaman (Son)	25	Kaccha	Elec., LPG Mobile (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
11	Killi Gazi/Jamak	Mehboob Ali (Head)	12	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	

12	Killi Gazi/Jamak	Master Noor Bux, Naimatullah(Son)	19	Kaccha	Elec. Loop, Mobile, LPG (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
13	Killi Gazi/Jamak	Sher Dil Khan (Head)	7	Kaccha	Elec. Loop, Mobile, LPG (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
14	Killi Gazi/Jamak	Sadullah (Head)	16	Kaccha	Elec. Tele Mobile, LPG (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
15	Killi Gazi/Jamak	Bahram Khan/ M. Umer (Son)	10	Kaccha	Elec. (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
16	Killi Gazi/Jamak	Gul Jan (Head)	3	Kaccha	Elec. (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
17	Killi Zayan/Jamak	M. Afzal/M Anwar (Son)	23	Kaccha	Loop (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Cough Loose Motion	
18	Killi Zayan/Jamak	Munir Ahmad (Head)	6	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
19	Killi Zayan/Jamak	Gover Khan (Head)	4	Kaccha	No (Wood & animal waste)	Throw out	Flush, Pit Latrine, Open Area	Malaria, Cough Loose Motion	
20	Killi Zayan/Jamak	Sarfraz (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Cough Loose Motion	
21	Killi Zayan/Jamak	M. Azim/Rashid Ali (Son)	24	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Cough Loose Motion	
22	Killi Zayan/Jamak	M. Akbar (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
23	Killi Zayan/Jamak	Fazal Uddin (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Cough Loose Motion	
24	Killi Zayan/Jamak	Lakad Khan (Head)	7	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough Loose Motion	
25	Killi Haji Dost Muhammad Pathan/Sarwan	Haji Abdullah/ Munir Ahmad (Son)	21	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	

26	Killi Haji Dost Muhammad Pathan/Sarwan	Haji Abdullah (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
27	Killi Haji Dost Muhammad Pathan/Sarwan	M. Anwar (Head)	4	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
28	Killi Haji Dost Muhammad Pathan/Sarwan	Haji Dost Muhammad	42	Kaccha	No (Wood & animal waste)	Throw out	Flush	Malaria, Blood Pressure, Typhoid Cough	
29	Killi Haji Dost Muhammad Pathan/Sarwan	Khair Muhammad	13	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough, Flue	
30	Killi Haji Dost Muhammad Pathan/Sarwan	Nawab Khan	7	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough, Loose Motion	
31	Killi Haji Dost Muhammad Pathan/Sarwan	Ghulam Muhammad/ Baram Khan (Son)	10	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough, Loose Motion	
32	Killi M. Khair Padin/Sarwan	Jalal Khan (Head)	14	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer	
33	Killi M. Khair Padin/Sarwan	Aziz Ahmad (Head)	10	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
34	Killi M. Khair Padin/Sarwan	Mir M. Khair (Head)	17	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
35	Killi M. Khair Padin/Sarwan	Nazir Ahmad (Head)	3	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
36	Killi M. Khair Padin/Sarwan	M. Alim (Head)	19	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
37	Killi M. Khair Padin/Sarwan	M. Yousaf	4	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
38	Killi M. Khair Padin/Sarwan	Sher Muhammad (Head)	9	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer, Flue	
39	Killi M. Khair Padin/Sarwan	Abdul Samad	20	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cancer	
40	Killi Shayan/Jodai Kalat	M. Ismahil (Head)	13	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Asthma	
41	Killi Shayan/Jodai Kalat	Abdul Majeed (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Asthma	

42	Killi Shayan/Jodai Kalat	Shah Khuda Ram	12	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Asthma	
43	Killi Shayan/Jodai Kalat	Abdul Qadir	15	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
44	Killi Shayan/Jodai Kalat	Ghulam Ali/Tayab Shah (Brother)	12	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Open Area	Malaria, Cough, Flue	
45	Killi Shayan/Jodai Kalat	Fazal Shah (Head)	18	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Asthma	
46	Killi Shayan/Jodai Kalat	M. Qasim (Head)	9	Sholtor	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Asthma, Cough	
47	Killi Shayan/Jodai Kalat	M. Azeem (Head)	15	Sholtor	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
48	Killi Gozaggi/Jodai Kalat	M. Hanif/Asmatullah (Son)	12	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Flush	Malaria, Skin Diseases, TB, Loose Motion	
49	Killi Gozaggi/Jodai Kalat	Syed Abdul Rasheed/Syed Atta Muhammad (Son)	11	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Flush	Malaria, Skin Diseases, TB, Loose Motion	
50	Killi Gozaggi/Jodai Kalat	Abdul Karim	14	Kaccha	Elec. (Wood & animal waste)	Throw out	Open Area	Malaria, Skin Diseases, TB, Loose Motion	
51	Killi Gozaggi/Jodai Kalat	Saib Khan/Muktiyar Ahmad (Son)	7	Kaccha	Elec. (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Skin Diseases, TB, Loose Motion	
52	Killi Gozaggi/Jodai Kalat	Noorullah/ M. Tariq (Son)	9	Kaccha	Elec. (Wood & animal waste)	Throw out	Flush	Malaria, Skin Diseases, TB, Loose Motion	
53	Killi Gozaggi/Jodai Kalat	Yar Muhammad/Adbul Basit (Son)	10	Kaccha	Elec. (Wood & animal waste)	Throw out	Open Area	Malaria, Skin Diseases, TB, Loose Motion	
54	Killi Gozaggi/Jodai Kalat	Abdul Latif/Ziaur Rahman (Relative)	8	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Skin Diseases, TB, Loose Motion	

55	Killi Gozaggi/Jodai Kalat	Syed Hassan Shah/ Atta M. Shah (Uncle)	5	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Skin Diseases, TB, Loose Motion	
56	Killi Raza Muhammad Godano/Tohmmulk	M. Umar/ Imran Khan (Son)	8	Kaccha	Elec. Mobile (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Cough, Flue, Eye Diseases, TB	
57	Killi Raza Muhammad Godano/Tohmmulk	Haji Mussa Khan/ Jan Zaib (Son)	12	Kaccha	Elec. Mobile (Wood, LPG & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases, TB	
58	Killi Raza Muhammad Godano/Tohmmulk	Mushtaq Ahmad/ Saib Ali (Son)	12	Kaccha	Elec. Mobile (Wood, & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases, TB	
59	Killi Raza Muhammad Godano/Tohmmulk	Said Muhammad/ Lal Muhammad (Son)	10	Kaccha	Elec. Mobile (Wood, & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases, TB	
60	Killi Raza Muhammad Godano/Tohmmulk	Murad Khan (Head)	8	Kaccha	Elec. Mobile (Wood, & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases, TB	
61	Killi Raza Muhammad Godano/Tohmmulk	Sufi Khuda Buksh (Head)	11	Kaccha	Elec. (Wood, & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases,	
62	Killi Raza Muhammad Godano/Tohmmulk	Sakhi Qadir Dad/ Mujaid Ali (Son)	7	Kaccha	Elec. Mobile (Wood, & animal waste)	Throw out	Pit Latrine	Malaria, Cough, Flue, Eye Diseases,	
63	Killi Raza Muhammad Godano/Tohmmulk	Din Muhammad (Head)	22	Kaccha	Elec. Loop, Mobile (Wood, & animal waste)	Throw out	Open Area	Malaria, Cough, Flue, Eye Diseases,	
64	Killi Ghulam Yaseen/ Tohmulk	Gull Khan (Head)	11	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
65	Killi Ghulam Yaseen/ Tohmulk	Haji Qadi Bux (Head)	11	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
66	Killi Ghulam Yaseen/ Tohmulk	Ali Ahmad (Head)	7	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	

67	Killi Ghulam Yaseen/ Tohmulk	M. Azim (Head)	13	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
68	Killi Ghulam Yaseen/ Tohmulk	Javed Khan (Head)	7	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
69	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Abdul Rasheed (Head)	2	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
70	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Faridullah/Ali Ahmad (Brother)	10	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
71	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Ali Ahmad (Head)	7	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Cough	
72	Killi Eri Kalag/Raskoh	M. Khan (Head)	16	Kaccha	Loop (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Loose Motion, TB	
73	Killi Eri Kalag/Raskoh	Alam Baig (Head)	19	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Loose Motion, TB	
74	Killi Eri Kalag/Raskoh	Iqamat Ali (Head)	10	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Loose Motion, TB	
75	Killi Eri Kalag/Raskoh	Moula Buksh (Head)	19	Kaccha	No (LPG Wood & animal waste)	Throw out	Pit Latrine	Malaria, Loose Motion, TB	
76	Killi Eri Kalag/Raskoh	Elli Buksh (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Pit Latrine	Malaria, Loose Motion, TB	
77	Killi Eri Kalag/Raskoh	Abdul Salam (Head)	20	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Loose Motion, TB	
78	Killi Eri Kalag/Raskoh	Malik Meesan (Head)	8	Kaccha	No (LPG, Wood & animal waste)	Throw out	Open Area	Malaria, Loose Motion, TB	
79	Killi Eri Kalag/Raskoh	Sharafud Din (Head)	11	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Loose Motion, TB	
80	Killi Eri Kalag/Raskoh	Hawal Gul (Head)	8	Kaccha	No (Wood & animal waste)	Throw out	Open Area	Malaria, Loose Motion, TB	

**Table 3: Water resources, agricultural practices and income sources**

S. No.	Village	Source and quality of drinking water	Is water sufficient?	Water table depth (Now)/ 15 Years	Source of income	Agricultural	Is irrigation water sufficient?	Agricultural machinery owned	Remarks
						land owned			
1	Killi Khair Muhammad Jangal/Jamak	No	No	120/10 5 Ft	Agriculture (50%), Livestock (25%) Labour (25%)	32 Acre	Yes	No	Bring water from away on animal back
2	Killi Khair Muhammad Jangal/Jamak	No	Yes	120/10 5 Ft	Agriculture (40%), Services (40%)	20 Acre	Yes	No	Bring water from away on animal back
3	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (25%), Livestock (25%) Labour (25%)	14 Acre	Yes	No	Bring water from away on animal back
4	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (50%), Livestock (25%) Labour (25%)	28 Acre	Yes	Yes	Bring water from 3 Km
5	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (50%), Livestock (25%) Labour (25%)	8 Acre	Nil	No	Bring water from 3 Km
6	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (50%), Livestock (50%)	9 Acre	Nil	No	Bring water from 5 Km
7	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (50%), Livestock (25%) Labour (25%)	6 Acre	Nil	No	Bring water from 5 Km
8	Killi Khair Muhammad Jangal/Jamak	No	No	114/90 Ft	Agriculture (25%), Livestock (50%) Labour (25%)	9 Acre	Nil	No	Bring water from 5 Km
9	Killi Gazi/Jamak	PHE	No	70/45 Ft	Agriculture (25%), Livestock (25%) Services (50%)	700 Acre	Yes	No	Bring the water another tubewell
10	Killi Gazi/Jamak	PHE	Yes	70/45 Ft	Agriculture (50%), Livestock (25%) Services (25%)	200 Acre	No	No	
11	Killi Gazi/Jamak	PHE	Yes	70/45 Ft	Livestock (25%) Labour (50%)	Nil	No	No	

12	Killi Gazi/Jamak	PHE	No	70/45 Ft	Agriculture 20%, Livestock 10% Services (70%)	2 Acre	No	No	PHE tubewell out of order and bringing the Water from Pvt. tubewell
13	Killi Gazi/Jamak	PHE	No	70/45 Ft	Agriculture (50%), Livestock (50%) Labour (50%)	Nil	No	No	PHE Tubewell out of order and bringing the Water from Pvt. Tubewell
14	Killi Gazi/Jamak	PHE	No	70/45 Ft	Livestock (50%) Labour (50%)	Nil	No	No	PHE Tubewell out of order and bringing the Water from Pvt. Tubewell
15	Killi Gazi/Jamak	PHE	No	70/45 Ft	Agriculture (50%), Livestock (50%)	Nil	No	No	PHE Tubewell out of order and bringing the Water from Pvt. Tubewell
16	Killi Gazi/Jamak	PHE	No	70/45 Ft	Agriculture (50%), Services (50%)	4 Acre	No	No	PHE Tubewell out of order
17	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (50%), Livestock (50%), Services (25%)	20 Acre	No	No	
18	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (25%), Livestock (25%), Services (50%)	16 Acre	No	No	
19	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (25%), Livestock (75%),	9 Acre	No	No	
20	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (25%), Livestock (50%), Labour (25%)	32 Acre	No	No	
21	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (25%), Livestock (50%), Labour (25%)	24 Acre	No	No	
22	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (50%), Livestock (25%), Labour (25%)	12 Acre	No	No	
23	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (50%), Labour (50%)	10 Acre	No	No	
24	Killi Zayan/Jamak	PHE	Yes	60/50 Ft	Agriculture (40%), Labour (60%)	14 Acre	No	No	

25	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump & Karez	Yes	17/9 Ft	Agriculture (75%), Livestock (5%), Services (10%) Labour (10%)	36 Acre	No	No	
26	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump & Karez	Yes	17/9 Ft	Agriculture (25%), Livestock (25%), Labour (25%)	Nil	No	No	
27	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump & Karez	Yes	17/9 Ft	Agriculture (25%), Livestock (50%), Labour (50%)	6 Acre	Yes	No	
28	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump	Yes	17/9 Ft	Agriculture (75%), Livestock (25%)	170 Acre	Yes	No	
29	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump & Karez	Yes	17/9 Ft	Agriculture (60%), Livestock (20%) Labour (20%)	60 Acre	No	No	
30	Killi Haji Dost Muhammad Pathan/Sarwan	Hand Pump & Karez	Yes	17/9 Ft	Agriculture (25%), Livestock (50%) Labour (25%)	10 Acre	No	No	
31	Killi M. Khair Padin/Sarwan	Hand Pump, Karez & Tubewell	Yes	100/45 Ft	Agriculture (25%), Livestock (25%) Labour (50%)	20 Acre	No	No	
32	Killi M. Khair Padin/Sarwan	Hand Pump & Tubewell	No	100/45 Ft	Agriculture (50%), Livestock (50%)	12 Acre	No	No	
33	Killi M. Khair Padin/Sarwan	Hand pump	No	100/45 Ft	Agriculture (50%), Livestock (50%)	20 Acre	No	No	
34	Killi M. Khair Padin/Sarwan	No	Yes	100/45 Ft	Agriculture (50%), Livestock (50%)	54 Acre	Yes	No	
35	Killi M. Khair Padin/Sarwan	Tubewell	No	100/45 Ft	Agriculture (50%), Livestock (25%), Labour (25%)	30 Acre	No	No	
36	Killi M. Khair Padin/Sarwan	Hand pump Tubewell	No	100/45 Ft	Agriculture (50%), Livestock (25%), Labour (25%)	14 Acre	No	No	
37	Killi M. Khair Padin/Sarwan	Hand pump Tubewell	No	100/45 Ft	Agriculture (30%), Livestock (50%), Services (20%)	12 Acre	No	No	

38	Killi M. Khair Padin/Sarwan	Hand pump Tubewell	No	100/45 Ft	Agriculture (25%), Livestock (25%), Labour (50%)	3 Acre	No	No	
39	Killi M. Khair Padin/Sarwan	Hand pump Tubewell	No	100/45 Ft	Agriculture (40%), Labour (25%)	10 Acre	No	No	
40	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Agriculture (50%), Services (50%)	6 Acre	No	No	
41	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Agriculture (50%), Livestock (50%)	16 Acre	Yes	No	
42	Killi Shayan/Jodai Kalat	PHE	Yes	130/80 Ft	Agriculture (25%), Services (25%) Labour (50%)	10 Acre	No	No	
43	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Agriculture (50%), Labour (50%)	Nil	No	No	
44	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Agriculture (25%), Services (50%)	4 Acre	No	No	
45	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Agriculture (20%), Labour (50%)	12 Acre	No	No	
46	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Livestock (50%), Labour (50%)	8 Acre	No	No	
47	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/80 Ft	Livestock (50%), Labour (50%)	12 Acre	No	No	
48	Killi Shayan/Jodai Kalat	PHE	Yes	130/85 Ft	Agriculture (75%) Services (50%)	50 Acre	No	Yes	
49	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/85 Ft	Agriculture (75%) Services (50%)	40 Acre	No	Yes	
50	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/70 Ft	Agriculture (25%) Livestock (25%)	Nil	No	No	
51	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/70 Ft	Agriculture (50%) Services (50%)	36 Acre	Yes	No	
52	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/70 Ft	Agriculture (50%), Livestock (25%), Services (20%)	10 Acre	No	No	
53	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/70 Ft	Livestock (50%), Labour (50%)	Nil	No	No	
54	Killi Shayan/Jodai Kalat	Tubewell/PHE	Yes	130/70 Ft	Agriculture (50%), Services (50%)	50 Acre	Yes	Yes	

55	Killi Shayan/Jodai Kalat	Hand Pump, Tubewell and PHE	Yes	130/70 Ft	Agriculture (50%) Livestock (50%)	26 Acre	Yes	No	
56	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Agriculture (30%), Livestock (50%)	16 Acre	Yes	No	
57	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/100 Ft	Agriculture (40%), Services (60%)	24 Acre	Yes	Yes	
58	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Agriculture (30%), Shop keeping (30%)	8 Acre	No	No	
59	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Agriculture (40%), Labour (60%)	28 Acre	Yes	No	
60	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/130 Ft	Agriculture (25%), Labour (25%)	12 Acre	No	Yes	
61	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Livestock (25%) Labour (25%)	10 Acre	No	No	
62	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Agriculture (25%) Services (75%)	2 Acre	No	No	
63	Killi Raza Muhammad Godano/Tohmmulk	Tubewell PHE	No	150/120 Ft	Agriculture (25%) Livestock (25%)	30 Acre	Yes	No	
64	Killi Ghulam Yaseen/ Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (50%) Labour (50%)	24 Acre	No	No	
65	Killi Ghulam Yaseen/ Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (20%) Services (50%)	20 Acre	No	No	
66	Killi Ghulam Yaseen/ Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (50%) Labour (50%)	24 Acre	No	No	
67	Killi Ghulam Yaseen/ Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (30%) Labour (85%)	30 Acre	No	No	
68	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Tubewell PHE	Yes	150/110 Ft	Livestock (50%) Labour (25%)	8 Acre	No	No	

69	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (25%) Livestock (10%) Services (50%) Labour (20%)	20 Acre	No	No	
70	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (25%) Livestock (10%) Services (50%) Labour (20%)	20	No	No	
71	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Tubewell PHE	Yes	150/110 Ft	Agriculture (25%) Services (50%) Labour (25%)	8 Acre	No	No	
72	Killi Eri Kalag/Raskoh	Hand pump/PHE	Yes	15/20 Ft	Agriculture (25%) Livestock (25%), Services (25%) Labour (25%)	25 Acre	Yes	No	
73	Killi Eri Kalag/Raskoh	Hand pump/Tubewell/PHE	Yes	12/12 Ft	Agriculture (25%) L Labour (25%)	12 Acre	Yes	No	
74	Killi Eri Kalag/Raskoh	Tubewell/PHE	Yes	12/12 Ft	Agriculture (25%) Livestock (50) Services (25%)	10 Acre	Yes	No	
75	Killi Eri Kalag/Raskoh	Hand Pump/Tubewell/PHE	Yes	12/20 Ft	Agriculture (50%) Livestock (25%) Services (50%) Labour (25%)	12 Acre	Yes	No	
76	Killi Eri Kalag/Raskoh	Hand Pump/PHE	Yes	12/20 Ft	Agriculture (10%) Labour (50%)	8 Acre	Yes	No	
77	Killi Eri Kalag/Raskoh	Hand Pump/Tubewell/PHE	Yes	12/20 Ft	Agriculture (50%) Livestock (25%) Services (25%)	14 Acre	Yes	No	
78	Killi Eri Kalag/Raskoh	Hand Pump/Tubewell/PHE	Yes	12/20 Ft	Agriculture (25%) Labour (25%)	8 Acre	Yes	No	
79	Killi Eri Kalag/Raskoh	Hand Pump/Tubewell/PHE	Yes	12/20 Ft	Agriculture (25%) Services (75%)	10 Acre	Yes	No	
80	Killi Eri Kalag/Raskoh	Hand Pump/	Yes	12/20 Ft	Agriculture (75%) Labour (25%)	8 Acre	Yes	No	

		Tubewell/ PHE							
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**Table 4: Occurrence of Natural disasters (Floods) and management measures**

S. No.	Village	Floods							Remarks
		Regular phenomenon	Early warning system	Measures taken during floods	Success rate	Losses	Govt./NGO that helped	Success rate	
1	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Animals (50%) Agriculture Land (50%)	ARC NGO	50%	
2	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Agriculture Land (75%)	ARC NGO	50%	
3	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Animals (50%) Agriculture Land (100%)	ARC NGO	50%	
4	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Animals (75%) Agriculture Land (75%)	ARC NGO	50%	
5	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Agriculture Land (100%)	ARC NGO	50%	
6	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Animals (50%) Agriculture Land (100%)	ARC NGO	50%	
7	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (50%), Animals (100%) Agriculture Land (100%)	ARC NGO	50%	

8	Killi Khair Muhammad Jangal/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), Animals (50%) Agriculture Land (50%)	ARC NGO	50%	
9	Killi Gazi/Jamak	Yes	No	Move to High Plain	100%	Property (50%), Crops (50%), Animals (25%) Agriculture Land (50%)	No	0%	
10	Killi Gazi/Jamak	Yes	No	Move to High Plain	100%	Property (50%), Crops (50%), Agriculture Land (50%)	No	0%	
11	Killi Gazi/Jamak	Yes	No	Move to High Plain	100%	Property (50%), Agriculture Land (50%)	No	0%	
12	Killi Gazi/Jamak	Yes	No	Move to High Plain	75%	Property (50%), Crops (50%) Agriculture Land (50%)	No	0%	
13	Killi Gazi/Jamak	Yes	No	Move to High Plain	75%	Property (50%)	No	0%	
14	Killi Gazi/Jamak	Yes	No	Move to High Plain	50%	Property (25%)	No	0%	
15	Killi Gazi/Jamak	Yes	No	Move to High Plain	75%	Property (50%)	No	0%	
16	Killi Gazi/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Agriculture Land (100%)	No	0%	
17	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (25%) Agriculture Land (50%)	No	0%	
18	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (25%) Agriculture Land (50%)	No	0%	
19	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (50%) Agriculture Land (100%)	ARC NGO	50%	
20	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (50%) Agriculture Land (100%)	ARC NGO	50%	

21	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (100%) Agriculture Land (100%)	ARC NGO	50%	
22	Killi Zaya/Jamak	Yes	No	Move to High Plain	100%	Property (100%), Crops (100%), animals (50%) Agriculture Land (100%)	ARC NGO	50%	
23	Killi Zaya/Jamak	Yes	No	Move to High Plains	75%	Property (100%), Crops (100%), Agriculture Land (100%)	ARC NGO	50%	
24	Killi Zaya/Jamak	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), Animals (75%) Agriculture Land (100%)	ARC NGO	50%	
25	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Move to High Plains	100%	Property (50%), Crops (100%), Agriculture Land (75%)	No	0%	
26	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Move to High Plains	100%	Property (100%)	No	75%	
27	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Move to High Plains	100%	Property (100%), Crops (100%) and Agriculture Land (50%)	No	0%	
28	Killi Haji Dost Muhammad Pathan/Sarwan	Yes	No	Move to High Plains	100%	Property (100%) and Agriculture Land (75%)	No	0%	
29	Killi Haji Dost Muhammad Pathan/Sarwan	Yes	No	Move to High Plains	100%	Crops (50%) and Agriculture Land (50%)	No	0%	
30	Killi Haji Dost Muhammad Pathan/Sarwan	Yes	No	Move to High Plains	100%	Property (25%), Crops (100%), Agricultural land (30%)	No	0%	
31	Killi M. Khair Padin/Sarwan	No	No	Stay at Home	75%	Property (40%), Crops (50%), Agricultural land (50%)	No	0%	
32	Killi M. Khair Padin/Sarwan	Yes	No	Move to High Plains	100%	Property (25%), Crops (100%) Agricultural land (30%)	No	0%	

33	Killi M. Khair Padin/Sarwan	No	No	Move to High Plains	100%	Property (75%), Crops (100%) Agricultural land (50%)	No	0%	
34	Killi M. Khair Padin/Sarwan	Yes	No	Move to High Plains	100%	Property (75%), Crops (75%), Agricultural land (50%)	No	0%	
35	Killi M. Khair Padin/Sarwan	No	No	Move to High Plains	100%	Property (50%), Crops (50%), Agricultural land (5%)	No	0%	
36	Killi M. Khair Padin/Sarwan	No	No	Move to High Plains	100%	Property (100%), Crops (100%), Animals (50%) Agricultural land (30%)	No	0%	
37	Killi M. Khair Padin/Sarwan	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), Agricultural land (80%)	No	0%	
38	Killi M. Khair Padin/Sarwan	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), and Agricultural land (100%)	No	0%	
39	Killi M. Khair Padin/Sarwan	Yes	No	Move to High Plains	100%	Property (100%), Crops (50%), and Agricultural land (50%)	No	0%	
40	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	50%	Property (100%), Crops (100%), Animals (100%) and Agricultural land (50%)	ARC NGO	50%	
41	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	50%	Property (75%), Crops (100%), Animals (50%) and Agricultural land (50%)	ARC NGO	50%	
42	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), Animals (50%) and Agricultural land (50%)	No	50%	
43	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (50%), Animals (50%) and Agricultural land (50%)	No	50%	

44	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (50%), Animals (100%) and Agricultural land (50%)	ARC NGO	25%	
45	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), Animals (50%) and Agricultural land (100%)	ARC NGO	25%	
46	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), and Agricultural land (100%)	ARC NGO	50%	
47	Killi Shayan/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (100%), Crops (100%), Animals (50%) and Agricultural land (100%)	ARC NGO	25%	
48	Killi Gazaggi/Jodai Kalat	Yes	No	Move to High Plains	50%	Agricultural land (100%)	ARC NGO	25%	
49	Killi Gazaggi/Jodai Kalat	Yes	No	Move to High Plains	50%	Crops (100%) Agricultural land (50%)	ARC NGO	25%	
50	Killi Gazaggi/Jodai Kalat	Yes	No	Move to High Plains	50%	Crops (50%) Agricultural land (50%)	ARC NGO	50%	
51	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	100%	Property (50%), Crops (30%), Animals (50%) and Agricultural land (100%)	ARC NGO	25%	
52	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	100%	Animals (50%), Agriculture Land (50%)	ARC NGO	50%	
53	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	100%	Crops (50%), Animals (100%)	ARC NGO	25%	
54	Killi Gazaggi/Jodai Kalat	Yes	No	Move to High Plains	75%	Property (50%) Crops (20%), Animals (50%) Agriculture Land (100%)	ARC NGO	25%	
55	Killi Gazaggi/Jodai Kalat	Yes	No	Move to High Plains	100%	Property (50%) Crops (50%), Animals (20%) Agriculture Land (100%)	ARC NGO	25%	

56	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%) Crops (50%) and Agriculture Land (100%)	ARC NGO	50%	
57	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%) Crops (100%), Animals (100%) and Agriculture Land (100%)	ARC NGO	50%	
58	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%) Crops (30%), Animals (100%) and Agriculture Land (50%)	ARC NGO	50%	
59	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Crops (100%), Animals (50%) and Agriculture Land (100%)	ARC NGO	50%	
60	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%), A and Agriculture Land (100%)	ARC NGO	50%	
61	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%), A and Agriculture Land (50%)	ARC NGO	50%	
62	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (25%)	ARC NGO	50%	
63	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Move to High Plains	50%	Property (50%) Crops (100%) and Agriculture Land (100%)	ARC NGO	50%	
64	Killi Ghulam Yaseen/Tohmulk	Yes	No	Move to High Plains	100%	Property (100%) Crops (100%), Animals (100%) Agriculture Land (100%)	ARC NGO	50%	
65	Killi Ghulam Yaseen/Tohmulk	Yes	No	Move to High Plains	100%	Property (100%) Crops (50%), Animals (50%) Agriculture Land (100%)	ARC NGO	50%	

66	Killi Ghulam Yaseen/ Tohmulk	Yes	No	Move to High Plains	100%	Property (100%) Crops (100%), Animals (100%) Agriculture Land (100%)	ARC NGO	50%	
67	Killi Ghulam Yaseen/ Tohmulk	Yes	No	Move to High Plains	100%	Property (100%) Crops (100%), Animals (50%), Agriculture Land (100%)	ARC NGO	50%	
68	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Yes	No	Move to High Plains	50%	Property (100%) and Agriculture Land (50%)	ARC NGO	25%	
69	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Yes	No	Move to High Plains	50%	Property (100%) and Agriculture Land (50%)	ARC NGO	25%	
70	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Yes	No	Move to High Plains	50%	Property (100%) Crops (100%) and Agriculture Land (75%)	ARC NGO	50%	
71	Killi Ghulam Yaseen Abad Bope Raik/Tohmulk	Yes	No	Move to High Plains	75%	Property (75%) Crops (100%) and Agriculture Land (75%)	ARC NGO	25%	
72	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (25%) Crops (5%) Agriculture Land (75%)	No	0%	
73	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Crops (100%) and Agriculture Land (50%)	No	0%	
74	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (25%) Crops (50%) Animals (25%) and Agriculture Land (75%)	No	0%	
75	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (25%) Crops (50%) Animals (25%) and Agriculture Land (50%)	No	0%	
76	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (50%) Crops (100%) Animals (100%) and Agriculture Land (100%)	No	0%	
77	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (50%) Crops (40%) Animals (20%) Agriculture Land (100%)	No	0%	

78	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (100%) Crops (50%) Animals (50%) Agriculture Land (100%)	No	0%	
79	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (75%) Crops (100%) Animals (50%) Agriculture Land (100%)	No	0%	
80	Killi Eri Kalag/Raskoh	Yes	No	Move to High Plains	50%	Property (50%) Crops (75%) Animals (40%) Agriculture Land (100%)	No	0%	

**Table 5: Occurrence of Natural Disasters (Droughts) and management practices**

S. No.	Village	Drought						Remarks
		Regular phenome non	Early warning system	Measures taken during drought	Losses	Govt./NG O that helped	Success rate	
1	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
2	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
3	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (90%)	No	0%	
4	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
5	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
6	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
7	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
8	Killi Khair Muhammad Jangal/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
9	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
10	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%),	No	0%	

					Animals (50%)			
11	Killi Gazi/Jamak	Yes	No	Stay at Home	Animals (50%)	No	0%	
12	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (50%), Animals (50%)	No	0%	
13	Killi Gazi/Jamak	Yes	No	Stay at Home	Nil	No	0%	
14	Killi Gazi/Jamak	Yes	No	Stay at Home	Nil	No	0%	
15	Killi Gazi/Jamak	Yes	No	Stay at Home	Animals (100%)	No	0%	
16	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%)	No	0%	
17	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%)	No	0%	
18	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
19	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
20	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%)	No	0%	
21	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
22	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
23	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (50%)	No	0%	
24	Killi Gazi/Jamak	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
25	Killi Haji Dost Muhammad Pathan/Sarwan	Yes	No	Stay at Home	Crops (100%), Animals (75%)	No	25%	
27	Killi Haji Dost Muhammad Pathan/Sarwan	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
28	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Stay at Home	Crops (100%), Animals (75%)	No	0%	
29	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Stay at Home	Crops (50%), Agriculture Land (50%)	No	0%	
30	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Stay at Home	Crops (50%), Animals (50%)	No	0%	
31	Killi Haji Dost Muhammad Pathan/Sarwan	No	No	Stay at Home	Crops (50%), Animals (50%)	No	25%	

32	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
33	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
34	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
35	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
36	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
37	Killi M. Khair Paddin/Sarwan	No	No	Stay at Home	Crops (100%)	No	0%	
38	Killi M. Khair Paddin/Sarwan	Yes	No	Stay at Home	Crops (100%)	No	0%	
39	Killi M. Khair Paddin/Sarwan	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
40	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (90%)	No	0%	
41	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (90%)	No	0%	
42	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (90%)	No	0%	
43	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Animals (100%)	No	0%	
44	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
45	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (70%)	No	0%	
46	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (70%)	No	0%	
47	Killi Shayan/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (50%)	No	0%	
48	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%)	No	0%	
49	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%)	No	0%	
50	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%, Animals (75%)	No	0%	
51	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
52	Killi Gazaggi/Jodai	Yes	No	Stay at Home	Crops (100%),	No	0%	

	Kalat				Animals (50%)			
53	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Animals (50%)	No	0%	
54	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
55	Killi Gazaggi/Jodai Kalat	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
56	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
57	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
58	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
59	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
60	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
61	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
62	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
63	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
64	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
65	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
66	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
67	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
68	Killi Raza Muhammad Godano/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
69	Killi Ghulam Yaseen Abad Bope Raik/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
70	Killi Ghulam Yaseen Abad Bope Raik/Tohmmulk	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
71	Killi Ghulam Yaseen Abad Bope	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	

	Raik/Tohmulk							
<b>72</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (50%), Animals (50%)	No	50%	
<b>73</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
<b>74</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (75%), Animals (50%)	No	0%	
<b>75</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (50%), Animals (75%)	No	0%	
<b>76</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
<b>77</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
<b>78</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
<b>79</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	
<b>80</b>	Killi Eri Kalag/Raskoh	Yes	No	Stay at Home	Crops (100%), Animals (100%)	No	0%	



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