RESEARCH REPORT ON

INCREASED IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES AND LIVELIHOOD

IN THE DISTRICTS MUZAFFARABAD, BAGH AND HAVELI, AJK

Foreword of Country Director Islamic Relief Pakistan IRP,

Pakistan has been receiving wake up calls about the rapidly changing climate and extremely unpredictable weather patterns. The country has been host to droughts, long dry spells, extreme rainfalls and snowfalls and most recently a flood that affected roughly 33 million people.

The country can't bear the financial, emotional and human cost of climatic changes happening at an alarming pace. Even the enchanting wilderness is being affected in a way no one ever imagined of. As it continues to reshape our planet, forecasts paint a disturbing image of the future.

Considering it to be the biggest challenge of our time, Islamic Relief has been actively advocating for climate justice and rights of the people of Pakistan alongside putting in efforts to bring a lasting change in practices and behaviors across Pakistan especially AJ&K.

Through an array of initiatives, our concerted efforts are aimed at making communities more resilient and aware of the changing climate. Together with other stakeholders including media, academia and government, we are carving out new pathways to address the crisis at hand.

This study is a step towards becoming more prepared and adaptive through resilient frameworks and interventions in different parts of AJ&K. In addition to that, the study will improve the capacities of local government and communities simultaneously strengthening the coordination between different stakeholders for a lasting and tangible change.

This study is an embodiment of IR's commitment to knowledge creation for viable future planning and community empowerment initiatives for long term development in areas where it matters the most.

With challenges mounting, these efforts and contributions by Islamic Relief are directed to make Pakistan a Climate Resilient country and equipping it with the right skills and knowledge to create better and safer tomorrow.

Asif Sherazi,

Country Director, Islamic Relief Pakistan

Foreword
Secretary AJ&K State

The secretary of Agriculture, Livestock, Irrigation, and ESMA sincerely appreciate the IRP team's successful completion of this research report. Although most climate scientists agree on the causes of the phenomenon, the current problems are complicated, and there are differing views on how to address climate change's consequences.

The effects of the climate are becoming more severe, which has serious ramifications for the humanitarian sector. The average global temperature is increasing, which is causing more extreme weather, shifting disease vectors, and worsening food and water insecurity.

In particular, the development aspirations of women, children, vulnerable rural communities, urban poor, and indigenous peoples are affected, with the impacts on these communities being acute and disproportionate.

The research study identified the areas where we can collaborate in order to address the effects of climate change, its impacts, necessary preventative measures, and potential roles for the actuarial profession in risk management.

This research study makes the case that the IRP should consider how it collaborates with the public sector to address the effects of climate change, enhance livelihoods, and resolve water quality issues.

Sincerely,

Javaid Ayub,

Secretary Agriculture, Livestock, Irrigation & ESMA

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Distribution of Poultry Birds, Feed,
Medicine

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Acknowledgment

This research was conducted as part of the "Water and Livelihood Inclusive Initiative (WALI) in Kashmir and Sustainable Initiative for Development in Kashmir (SIDK) projects by Islamic Relief Pakistan. IRP is currently engaging communities through participatory and gender inclusive approach under these projects, with gender mainstreaming, disaster risk reduction, protection, climate change adaptation, Food security and livelihoods, Advocacy and WASH. The aim of conducting this study is to Generating evidence by capitalizing partnerships with academia and public institutes to develop community focused and field based researches on increased impacts of climate change on water resources and livelihoods in the area to further present to relevant bodies for measures that inclusive, climate sensitive and adaptive.

It is indeed a great privilege for us to present this report which was developed following series of in-depth questioner surveys with local communities, focus group discussions, and key informant interviews with Govt. Line Departments representatives, Civil society representatives working at local and state level.

We would like to express our sincere appreciation to Islamic Relief Pakistan - IRP for providing an opportunity to conduct such an important assignment and showing their trust. It would not have been possible to develop this report without the technical backstopping of IRP team especially Mr. Muhammad Raza Hussain Qazi: (Advocacy & Campaigns Specialist, Dr. Shahid Parveen: (Food Security & Livelihood Specialist), Mr. Zeeshan Maqbool: (Area Program Manager, AJK), Mr. Zahid Ali Shah (Senior Research and Advocacy Officer, Mr. Ateeq ur Rahman: (Advocacy Officer, AJK), Mr. Mumtaz Hussain: (Senior Project Officer – WALI) and Mr. Muhammad Daood Abbasi (Monitoring and evaluation officer) who provided valuable feedback and expert opinion to contextualize report with the purpose to extract desired objectives.

We are grateful to all line departments for sharing valuable data reflected in the report. We would also like to extend our special gratitude to Civil Society members have also contributed their knowledge about the impacts of climate change on their lives and resources they use. Thanks also goes to Islamic Relief Pakistan field staff who facilitated consultant for interaction with local communities to document their thoughts regarding the impact of climate change on their lives and around.

List of Acronyms

ADB	Asian Development Bank
AJK	Azad Jammu & Kashmir
EPA	Environment Protection Agency
FGDs	Focused Group Discussions
IRP	Islamic Relief Pakistan
KII	Key Informant Interview
LGRDD	Local Government and Rural Development Department
NGO	Non-Governmental Organization
PCRWR	Pakistan Council for Research in Water Resources
PMD	Pakistan Meteorological Department
SDMA	State Disaster Management Authority

EXECUTIVE SUMMARY

Climate change is a burning issue in Pakistan including AJK with existing and potential impacts on the people's livelihood sources, leading obviously to the problems of food and water security. Realizing this, the Government of AJK arranged for having a climate change policy in consultation with 14 relevant departments/institutions that was subsequently translated to various strategies for all relevant departments/ institutions with each strategy addressed through comprehensive plans and that was supposed to oversee the implementation of the policy from community to state level. The policy remained un-attended and could not be implemented even after 4 years.

This study 'Research on increased Impacts of Climate Change on Water Resources and Livelihood in the districts Muzaffarabad, Bagh and Haveli, AJK' was initiated to assess the climate change situation in the 12 villages of the 3 Districts of Azad Kashmir namely Muzaffarabad, Haveli and Bagh.

The study reveals that there is no independent department to deal with issues of Climate Change, as there is one at Federal level in Pakistan, however, it is represented by a brief cell with in the Environmental Protection Agency (EPA) which is totally inadequate to address the issues of climate change and its negative influences on people's livelihoods and, food and water security.

The policy document that was prepared with financial support of ADB and technical inputs in the form of joint efforts of the officers from 14 Management Departments of AJK, is not available with most of the line departments due to unknown reasons.

Next serious issue is the lack of technical and professional collaboration and coordination between the research institutions (all universities of AJK for example), and the management departments, relevant to climate change which is one big reason for the lack of research solution as a basis for sustainable management solution.

The farmers and herders are the two important rural communities that are contributing significantly to the overall food supply and security for the entire population of AJK. However, being remotely located, they remain ignorant of some of the developments that can help them avoid certain problems.

AJK department of livestock has qualified and experienced staff but their frequent access to needy and remotely located community is important. Latest development in

animal husbandry, especially the availability of more resistant animal varieties, control of diseases etc., are some of the aspects that the relevant community must have knowledge about.

The negative impacts of climate change are more evidently seen and felt by the farmers in their fields. They very well know that some of the crops are not behaving the way they used to. Either more infested with insects and diseases or less productive as compared to before. With same conventional inputs, they normally don't get the desired outputs and thus less grains, lesser fruits and other products and lesser income. Agriculture Department has evolved a solution: instead of growing single crop, growing multiple crops may prove more profitable.

Agriculture and Livestock Departments may arrange for the establishment of demonstrations at all convenient locations that are accessible to majority of the relevant people, where solutions could be seen rather than told.

Like several other fields, lack of awareness is on top of the issues related to climate change. All groups of the society must know of what has happened to the environment with what impacts and what could happen in the near and far future?

Gajar Boti (Parthinium) has emerged as an invasive plant species, may be due to climate change, with potential danger for the Natural Resources, and it need immediate attention for its eradication.

The intensity and duration of the drought, heavy rains, floods and forest fires have increased manifold simply because of the climate change and early preparedness to the these disasters is required. The quantity and quality of water is steadily being diminished in AJK may be because of the imbalance between the existing water mass and enhanced rate of evaporation due to enhance number of hotter days beside the low quantity of snow fall on the foot hills. In order to create awareness about the water conservation, a social campaign is strongly required at all levels; Public Health Engineering department may lead such campaign.

NGO facilitation by the Government departments is not very satisfactory. The Government may facilitate the available NGOs in their work with the communities and encourage them to be partners in the solutions finding mission.

The production of agricultural crops has reduced to a considerable level (30% as per the agriculture department), primarily due to population increase and the emergence of more houses and other buildings on the agricultural land. On one hand the land holdings have reduced in size, on the other, the production has decreased. The combined impacts are seen in the form of migration of youth either to nearby cities or abroad for seeking better livelihood opportunities. This could be one form of climate induced migration with unpleasant consequences.

As a biological indicator, the shifting of Forest plant species to higher altitudes has become evident. Shisham (Dalbergia sissoo), for example is now frequently seen in the blue pine zone, totally against the situation just 40 years ago. Similarly, some of the Wildlife species are also being seen out of their original habitats. The Jungle crow has now been replaced by house crow; while the Wild boar are now present in the colder parts of the State as well (Wildlife department).

1. INTRODUCTION

1.1. Climate Change General Background

Climate change is a global issue alarmed since 19th century by the scientists with its obvious impacts felt in Pakistan for the last couple of decades in various forms, especially in the context of the water, food security and livelihood. The situation might get worsened in the future. According to some of the predictions (Regional Circulation Model, for example) the mean annual temperature has been stipulated to increase by 1.4oC by 2030, 2.4oC by 2060 and 4.7oC by 2090 enhancing the community's vulnerability further to climate change .

Some of the sectors that are being visibly impacted by Climate change are biodiversity in general, agriculture, forestry, and water resources in particular with mild to serious consequences for animal husbandry, public health, energy and disasters of various nature, thus threatening the sustainable livelihood of the people.

1.2. Global context

Almost each country of the world has been impacted by the climate change to various extents; however, a world map shows the countries that are highly vulnerable:

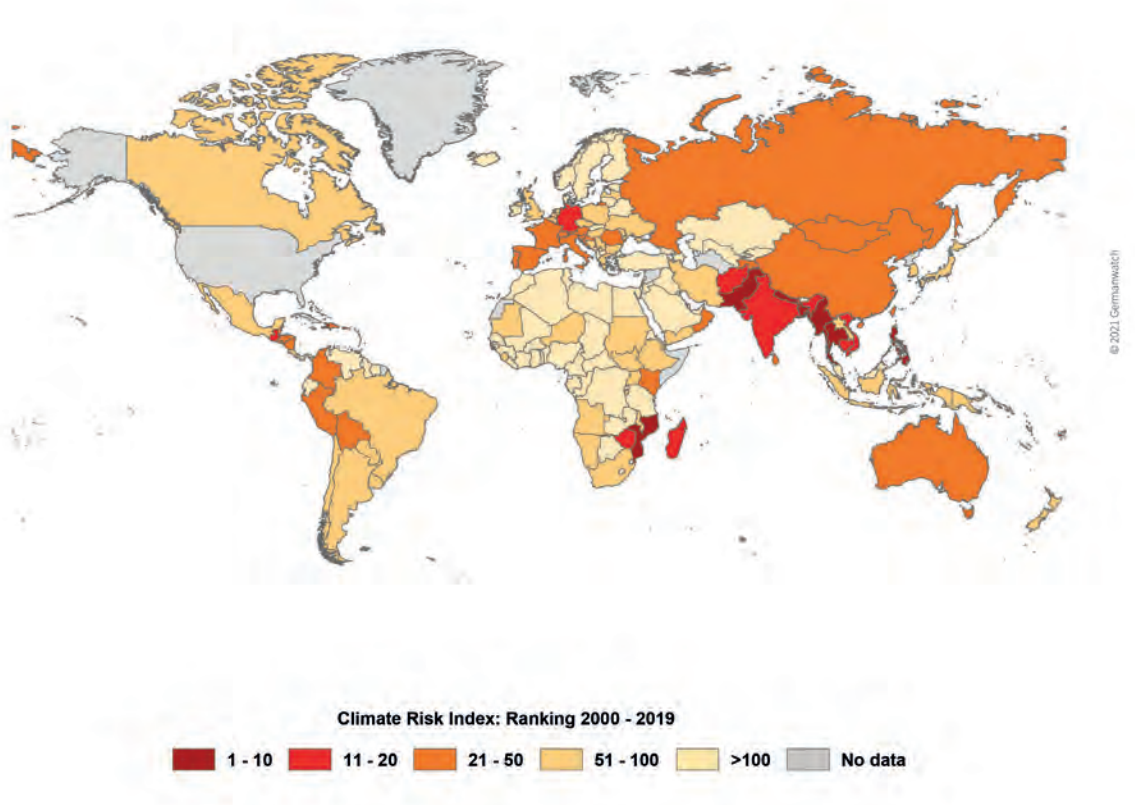


Figure 1 Global Climate Index Ranking 2019

The figures related to the impacts of climate change on global community are horrible that are summarized in the following diagram:

Figure 2 WMO Climate Risks, extreme Event and Related Impacts

A donor's conference of countries Cop27 agreed to create a special fund for "loss and damage" which will effectively compensate people who have suffered the most severe climate impacts, ones so bad they cannot be adapted to

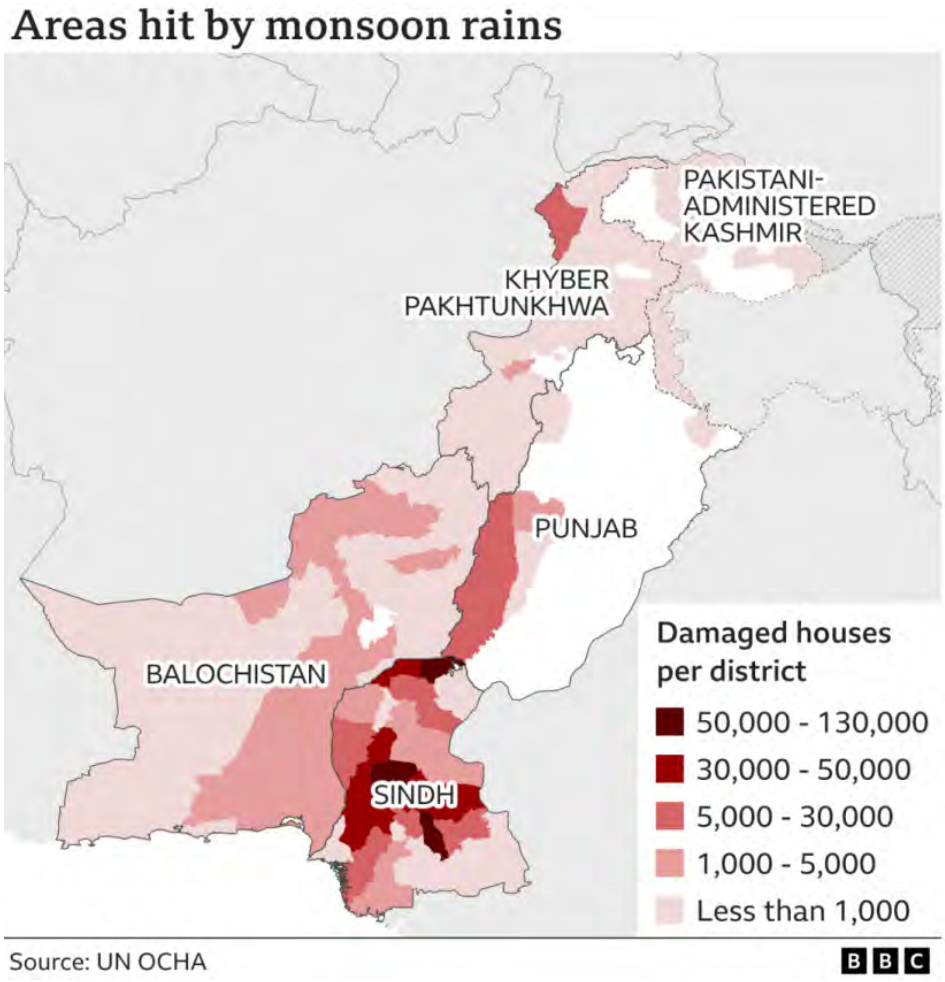
CRI 2000-2019 (1999-2018)	Country	CRI Score	Fatalities	Fatalities per 100 000 inhabitants	Losses in million $US PPP	Losses per unit GDP in %	Number of Events (2000-2019)
1	Puerto Rico	7.17	149.85	4.12	4149.98	3.66	24
2	Myanmar	10.00	7 056.45	14.35	1512.11	0.80	57
3	Haiti	13.67	274.05	2.78	392.54	2.30	80
4	Philippines	18.17	859.35	0.93	3179.12	0.54	317
5	Mozambique	25.83	125.40	0.52	303.03	1.33	57
6	The Bahamas	27.67	5.35	1.56	426.88	3.81	13
7	Bangladesh	28.33	572.50	0.38	1860.04	0.41	185
8	Pakistan	29.00	502.45	0.30	3771.91	0.52	173
9	Thailand	29.83	137.75	0.21	7719.15	0.82	146
10	Nepal	31.33	217.15	0.82	233.06	0.39	191

Figure 3 The 10 Countries most affected from 2000 to 2019 (annual average)

1.3. National context

In the annual report for 2020, the Global Climate Risk Index (Report by David Eckstein) has placed Pakistan on the fifth spot on the list of countries most vulnerable to climate

change in its annual report for 2020. The report indicates that Pakistan lost 9,989 lives, suffered economic losses worth $3.8 billion and witnessed 152 extreme weather events from 1999 to 2018 and based on this data, the think-tank has concluded that Pakistan's vulnerability to climate change is increasing with the passage of time.



One of the reasons for Pakistan to be continuously ranked high in the long-term index of the report is mainly due to its geographical location. According to Government more than 33 million people have been affected by flood. Millions of people have hardly any access to clean drinking water, their crops have been destroyed, food is scarce, hunger is looming. Standing water is already a breeding ground for infectious diseases. Diarrhea, typhoid, cholera and malaria are spreading and endangering even more lives.

1.4. Local context

Azad Jammu & Kashmir State is the fragile territory and vulnerable to the negative impacts of climate change. The climate change impacts are seen in the shape of landslides, floods and drought in the rain fed areas. Due to these climatic impacts, the natural resources and physical infrastructure of the State are at risk which is alarming for the economy. The government needs to have strong coordination mechanism and will to implement the available sectoral strategy developed by the Planning and

Development Department of the State through the active involvement of the public institutions including universities, community organizations NGOs with focus on assessing the extent of threats to the livelihood options and opportunities and water resources of the State; and integrating the issues into the sectoral planning processes at district and local levels so that the society can move to a climate change resilient future.

Current and future climate projections made by the Pakistan Meteorological Department (PMD) give evidence of rapid climate change occurring in AJ&K. Temperature and rainfall records over the last fifty years (1960-2007) in the region show rising climate trends in the State with average maximum temperature increasing to 0.82 degrees and precipitation to 75mm. This has resulted in a number of extreme weather events such as flash floods and delays in normal rainfall patterns. Furthermore, the PMD data also shows that the region is experiencing longer hot days and increased heat waves in the summer season and decreased cold waves in the winter. The analyses presented by PMD show that region is getting one extra month of summer, similar to the rest of Pakistan since 1980. The impact of temperature and precipitation increase has adversely impacted the glaciers, agriculture system and biodiversity in the region, which can have negative effects on the ecosystem in the state.

2. BACKGROUND TO THE CURRENT STUDY

About two-third of population in AJK is still practicing agriculture and livestock rearing as main occupation to sustain livelihood. Of the total state land 13% or 166,432 hectares is under cultivation of which 92% of the cultivable area is rain fed, with major crops including maize, wheat and rice, whereas remaining 42.6% of the land area is controlled by the forest department of AJK and 11.6% of its area is under productive forest cover where varieties of Deodar, Kail, Blue Pine, Silver Fir and Chir Pine with associated of broad leaved trees grow. 16.9% area consists of thinly wooded forests (Forestry information booklet of AJK Forest Department).

In AJK, landslides, cloud bursts, glacial lake outbursts, drought, and flash floods are all common hazards. Communities, who are bearing the brunt of climate change, have no say in the planning and decision making processes, nor they get required level of any preventive or mitigation support until the damage threatens their lives. Impacts posed by climate change are gaining an increasing interest in climate change research, policy, and implementation of climate change actions connecting with the fields of climate change adaptation. AJK is experiencing increased variation in temperature and precipitation, which is causing harm. The decline in environmental quality and depletion of natural resources like water and forest have serious social and economic consequences for those who depend on ecosystems. Environmental degradation together with urban migration lead to poor water quality for the public consumption. To get adopted to these rapid changes taking place and foreseeing the AJ&K peculiar vulnerabilities to climate change impacts due to which its water, food and energy security along with other sectors are at risk which is alarming for the economy of the State .

To this end, IRP has conduct a research study that aims to **"Generate evidence on increased impacts of climate change livelihoods (Agriculture & Livestock), Water Resources, Biodiversity and Ecosystem"** in three districts of Azad Jammu & Kashmir including Muzaffarabad, Bagh and Haveli to further present to relevant bodies for measures that inclusive, climate sensitive and adaptive.

The target districts fall in the temperate and subtropical zones and are mostly covered by the hilly and mountainous terrain characterized by deep ravines, rugged and undulating landscape with small patches of valleys. The mountain ecosystems are relatively unstable with inherent low productivity that is the bases of people livelihood which are further constrained by the small land holdings and scarcity of cultivable land. The potential for growing fruit and vegetable is adequate though the land holdings are small (0.93 hectares) to have enough income for each owner.

Weather extremes cannot be mitigated alone by reducing emissions or investments to take account of future climate induced risks. There is a need to leverage the existing social and economic protection systems so that these impacts do not worsen future resilience of the people.

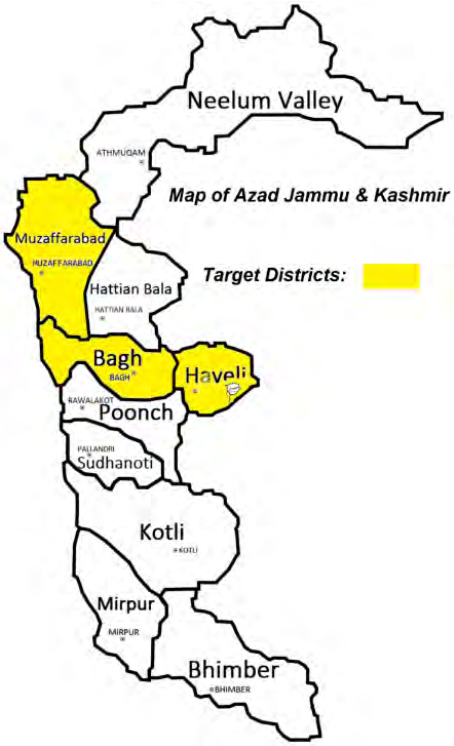
2.1 Objectives

1. Establishing the Climate change impact research around livelihood, water, Biodiversity and Ecosystem of the area in a scientific manner that is strongly coherent with field driven indigenous knowledge.
2. Review existing sectoral policies/Acts, strategies, action plans (Agriculture, Livestock, land use, Climate Change, Forest, Water) and their implementation in relation to increased impact of climate change, gaps identification and way forward to establishing consistency and coherence backed by evidence, research and development.
3. Documenting the Climate change association with local weather pattern and weather events, their subsequent impacts on indigenous livelihood sources (local economy depends on) and gauge the demonstrated Shift in the livelihood patterns over the period of time (20 – 25 Years)
4. To create awareness among the public, and to sensitize them, how to maintain and improve existing livelihood practices, manage water resource and conserve biodiversity of the area for overall wellbeing of local people
5. Develop a policy recommendation that will showcase a piece of information around prevailing major climate change impacts and appropriated preparedness, mitigation and adoptive measures that will contributes in resilience building of vulnerable communities

3. RESEARCH METHODOLOGY

3.1 - The study area

Three districts of AJK were chosen for the study on climate change, impacts and needful adaptations that represent the Himalayan temperate and subtropical ecological zones. These districts are Muzaffarabad, Bagh and Haveli that are represented on the map of Azad Jammu & Kashmir below.



3.2 Selected villages for sampling

Keeping in view the time limitation and for the selected villages to be truly representatives of the target districts, 4 villages were picked randomly for the Collection of information and consultations with the local community, one each in the north, south, east and west of the on the basis of their geographical location representing all corners of the district. These villages were having climate change impact in one way or the other. The livelihood and water were the two factors which are being faced by the people of these villages. The names and locations of the selected villages with their grid reference are tabulated below:

Table 1- Sample Villages

S. No.	Village Name	District	GPS Coordinate
1	Halan Shamali	Haveli	33°54'58.33"N, 74° 6'2.05"E
2	Mohri Meelvan	Haveli	33°55'37.01"N, 74° 5'11.78"E
3	Bidhara	Haveli	33°54'41.84"N, 74° 8'49.16"E
4	Hundi Peeran	Haveli	33°53'14.70"N, 74° 8'23.80"E
5	Neelabut	Bagh	33°59'48.27"N, 73°35'20.14"E
6	Lasdana	Bag	33°54'55.02"N, 73°57'39.60"E
7	Sudhan Galli	Bagh	34°4'28.47"N, 73°44'36.55"E
8	Rawli	Bagh	33°56'54.45"N, 73°42'42.85"E
9	Punjkot	Muzaffarabad	34°23'41.90"N, 73°42'57.36"E
10	Khunbandway	Muzaffarabad	34°16'30.71"N, 73°34'4.28"E
11	Therian	Muzaffarabad	34°14'43.94"N, 73°32'10.97"E
12	Patika	Muzaffarabad	34°27'3.38"N, 73°33'8.93"E
13	Kahori	Muzaffarabad	34°26'42.36"N, 73°30'14.72"E

3.3 Data Collection Tools and Techniques

The quantitative and qualitative techniques have been combined in a mixed approach. Along with a questionnaire survey, the data was gathered through interactions, interviews, and observation. The theoretical viewpoint is based on a review of the literature, including both peer-reviewed and by another sources, as well as reviews of related research studies and theoretical writings on the practical application of climate change.

3.3.1 Quantitative Survey

A total of 132 individuals were interviewed including male 77 and female 55. These individuals were between the age group of 25 to 65 including person with disabilities and elderly people.

3.3.2 Qualitative Survey

A total of 12 Focused Group Discussions (FGDs) and on an average 11 Key Informant Interviews (including line departments at district and state level) have been conducted to support the quantitative surveys. FGDs were held with male and female of different ages collectively in selected villages of all three districts and KIIs were conducted with public officials and civil society organizations to get a better understanding with clearer picture of increased impact of climate change on livelihood and water resources in the targeted districts.

4. RESULTS AND KEY FINDINGS

4.1 People's perceptions of climate change

4.1.1 A generic overview of climatic variable in public perception

Increase in temperature, floods, drought and landslides were the most concerns of all the communities while hailstorms and windstorms had the mixed trends

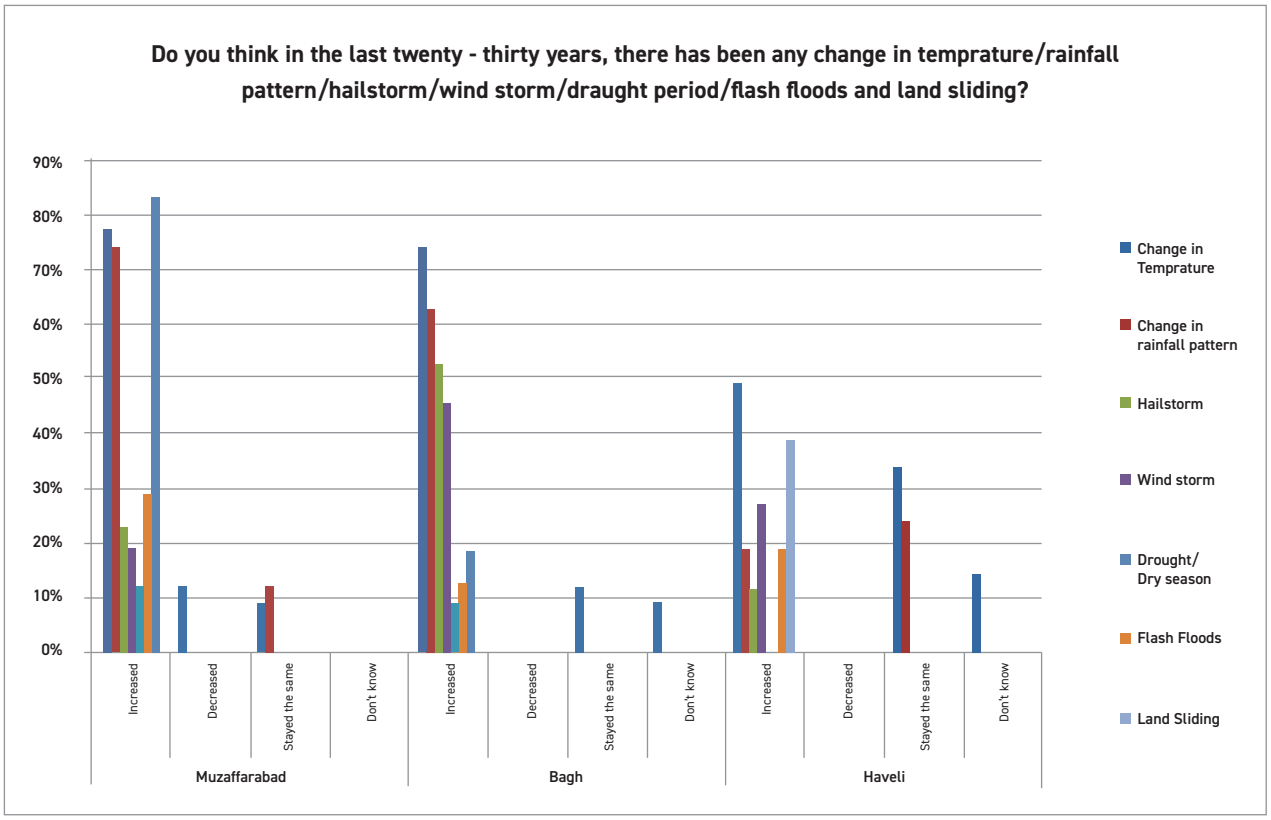


Figure 6: Last 20 -30 year change/ fluctuation in climatic variables

This was interesting to note that almost each of the respondents were aware of the change in climate, though the way they perceived it was somewhat different from each other. However, the unprecedented, erratic and irregular rains were indicated as the visible sign of climate change by almost each of the community members in all of the target districts. Others noticed different impacts and indicators. For example, the community of Bagh and Haveli were of the opinion that there is a drastic reduction in the yield of agricultural crops by more than 50% while this was less than 50% to the community of Muzaffarabad District. When asked about their opinion on the possible causes of climate change the deforestation and burning of wood were rated as No1 by almost everyone while the vehicular carbon emission was not considered that important.

1 The opinions of communities and officials of the line department related to the responsible factors are contained in the section on recommendations of this report.

2 Regarding indicators of climate change the communities from Muzaffarabad District were quite sure of enhanced temperature, rainfall, hailstorms, drought period, landslides and flash floods as major indicators, however, though still sure of same indicators, the communities of Bagh had less clarity on the issue followed by the communities of District Haveli who were further unclear on such issues.

3 While the summary of the community responses is available in the graphic form below and names of the respondents in Annex I. The results of the surveys is being presented in the graphical form below:

4.1.2Major Causes of Climate Change in AJK pro-spective

The majority of the community perception about the causes of climate change was the deforestation and wood burning. Very little statements were given about the ozone layer depletion, industrial and transport gas emission and atmospheric pollution.

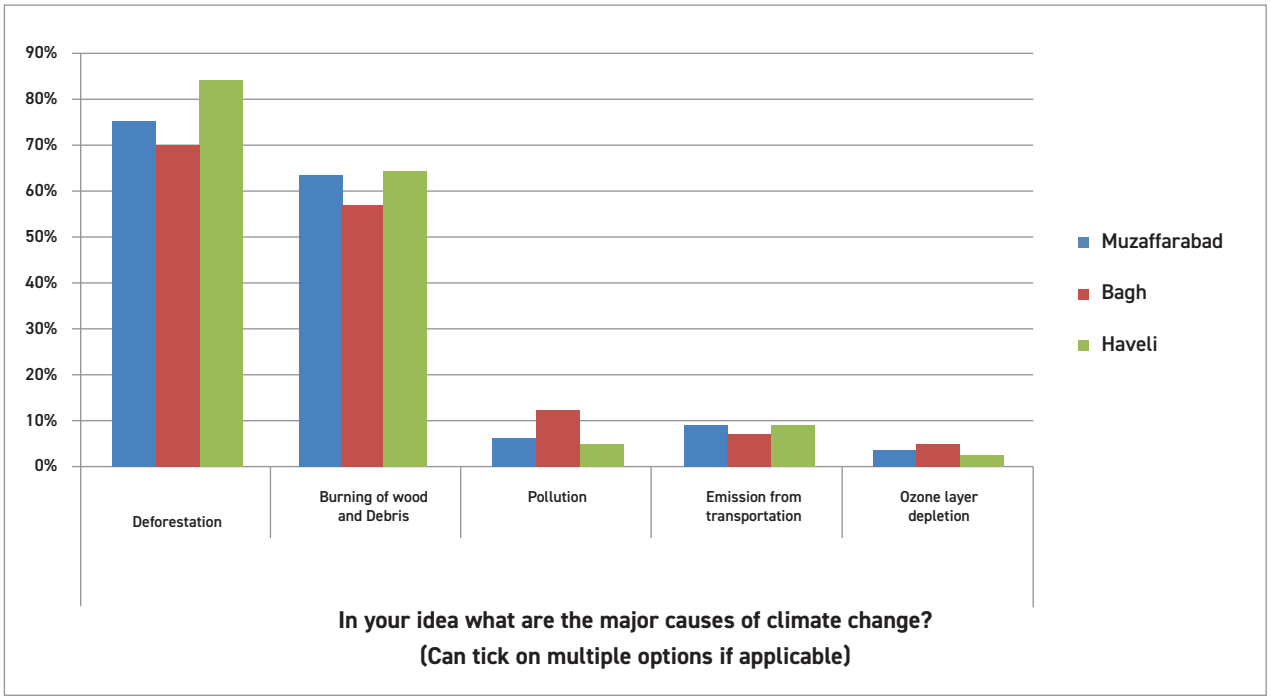


Figure 7- Major causes of climate change in AJK

4.1.3 Impact of Climate Change on Water Resources

4.1.3.1 Major water resources of the area

Most of the agriculture is produced on the rain fed areas. The water sources for the other uses are mostly dependent on the perineal and seasonal springs in the rural areas. Irrigation through stream water is limited and so are the wells. Heavy rain showers or unseasonal rains are harmful for the crops and the fruits. This needs expert guidance for adaptation due to climatic impacts on water.

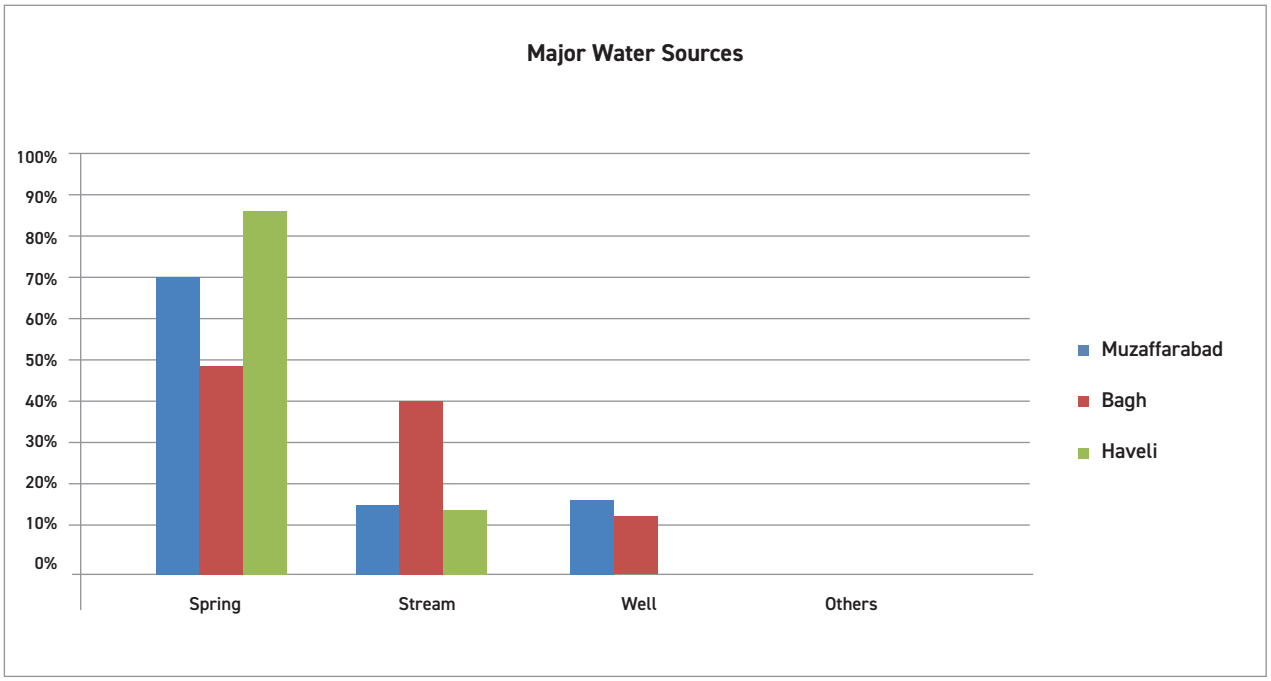
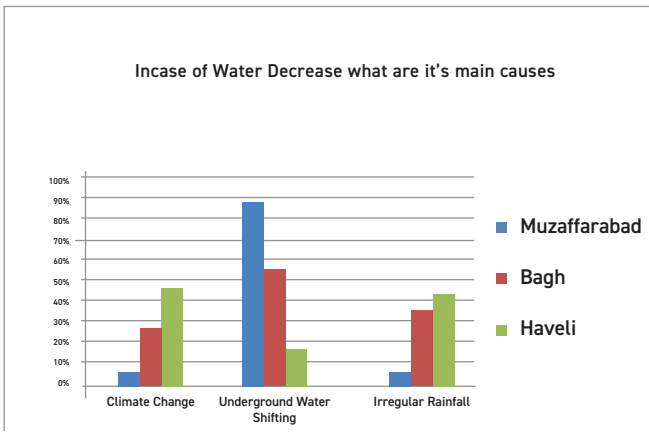


Figure 8- Major water resources of the area

4.1.3.2 Change in water resource availability

People of Bagh district have shown highest decrease in water availability (87%) while Muzaffarabad has shown comparatively low (67%). But trend shows the decrease in water availability. Very few responded no change.



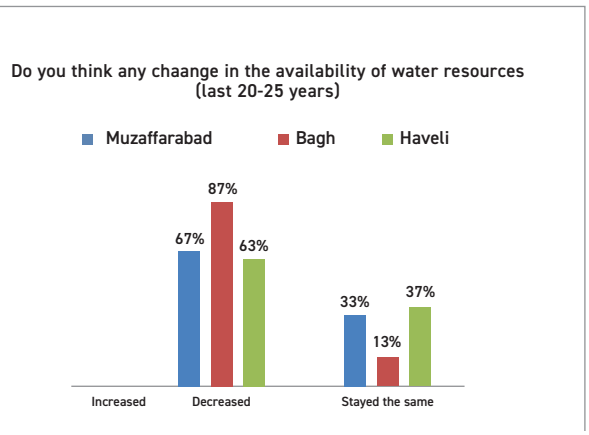


Figure 9- Change in water resource availability | Figure 10- Change in water resource availability

4.1.3.3 Water accessibility

Almost all the communities of three districts were of the view that the access to water has become a problem and negligible number mentioned no change. The drying of water springs and groundwater level depletion were the main reasons shown for the decrease of water resources by the communities of all three districts. Water channel damage was noticed by the people of Haveli only.

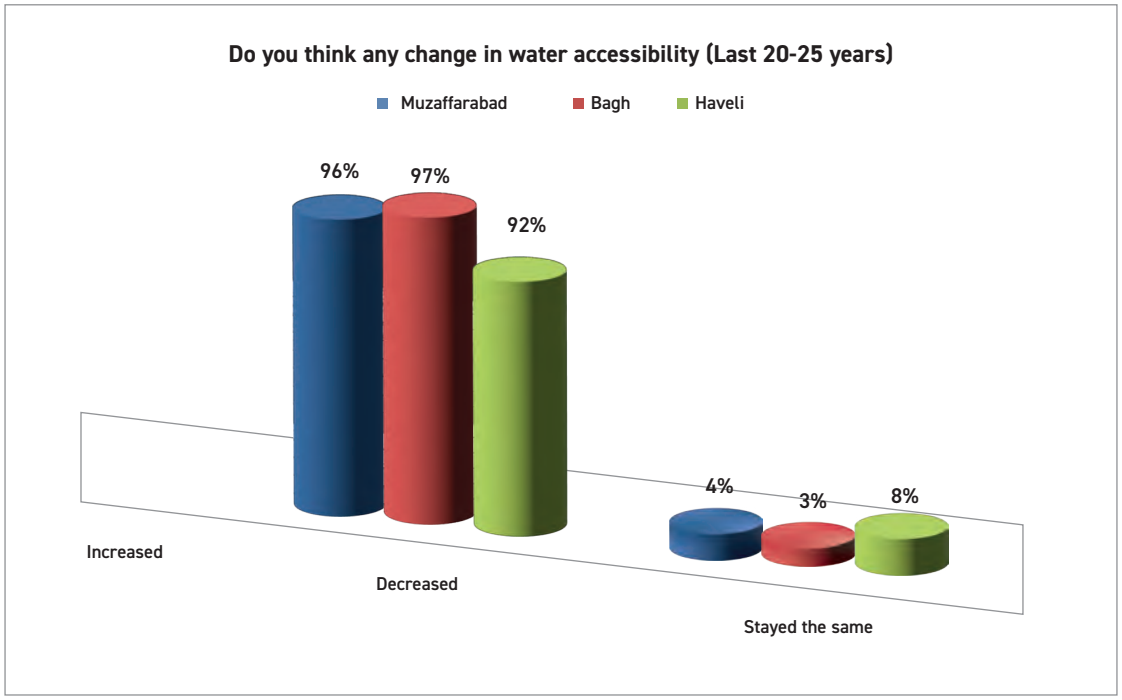


Figure 11- Water accessibility

4.1.3.4 Status of water resources

There is less knowledge of climate change impact on the decrease in water level but underground water level gone down was the main idea of the communities. This shows the need of awareness rising of the community about the impacts of the climate change and preparedness for it.

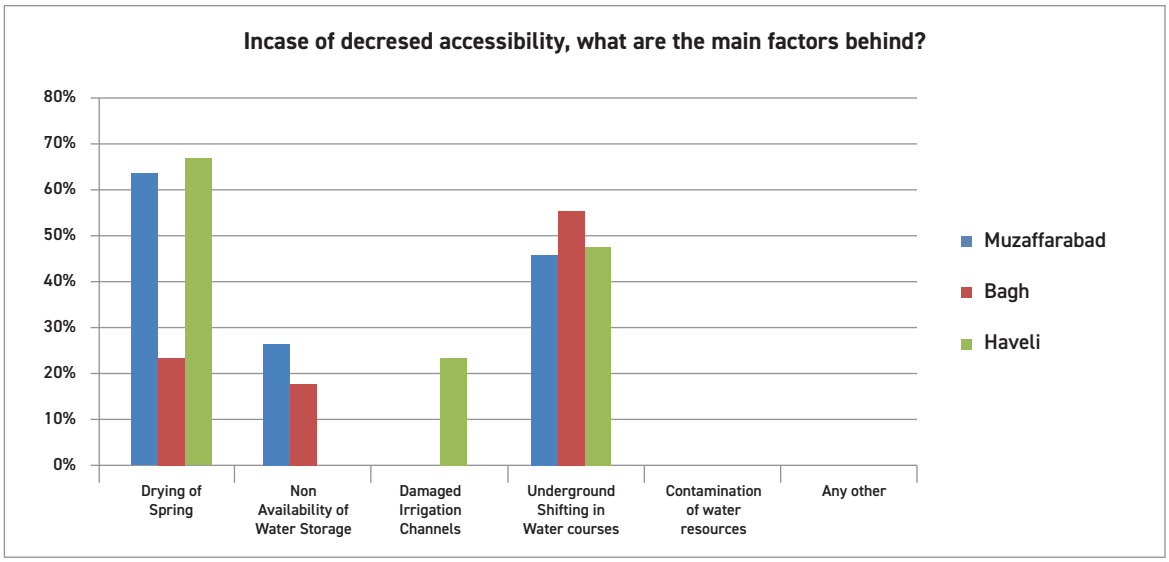


Figure 12: Factors behind the decreased water accessibility

4.1.4 Impact of Climate Change on Livelihood and forestry

Communities of all the three districts have shown their consensus on the tremendous decrease in the forest cover. People's perception of Illegal transport of wood is high in Muzaffarabad and Haveli and fuel wood consumption highest in Haveli, and lowest in Muzaffarabad.

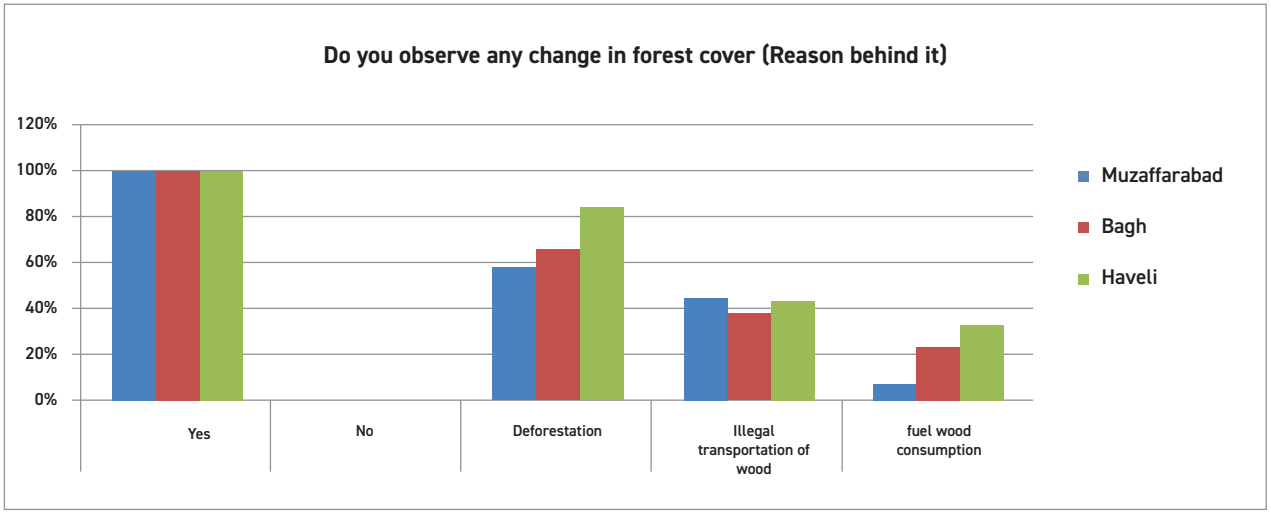


Figure 13: community perception about the decrease in forest cover

Landownership decrease was noticed everywhere, pest problem and drop in market value of the crop was also noticed but invasive species and plants had least response.

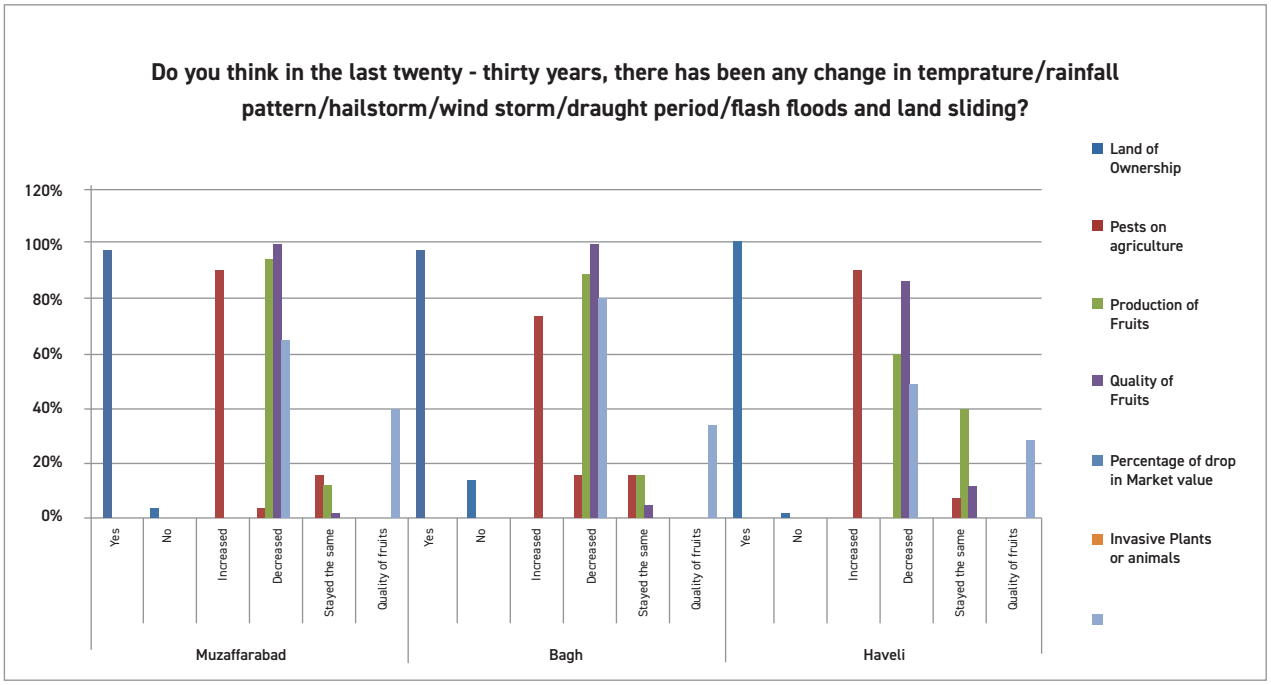


Figure 14: Impact of Climate Change on Livelihood sources

Increase in temperature, decrease in crop yield, unexpected rains and interrupted flow regime of streams were the effects due to climate change as per the statements of the communities of all three target districts. No knowledge of Biodiversity losses and little about the drought.

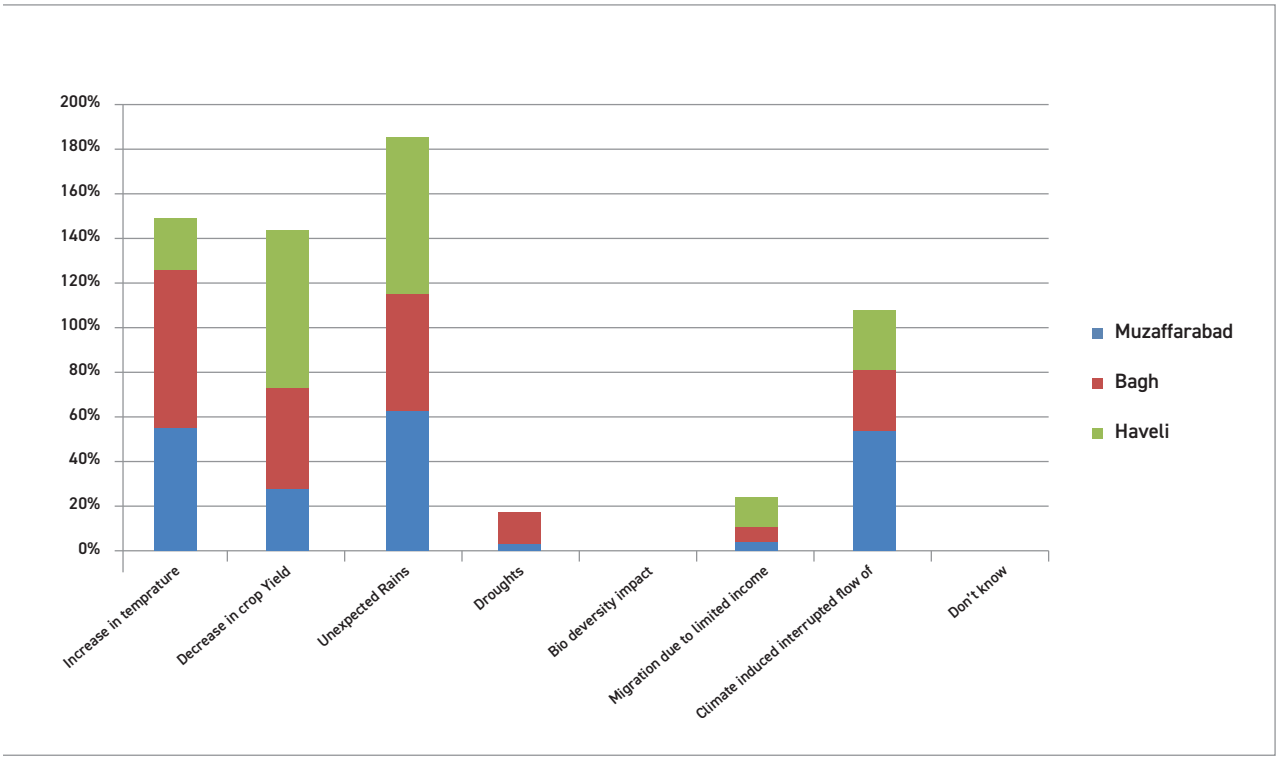


Figure 15: Comparative analysis of climatic variables, livelihood and climate induced migration

All parameters of decrease in agriculture production, quantity and quality of production, loss in crop during the last two decades and loss in trade are the impacts of climate change.

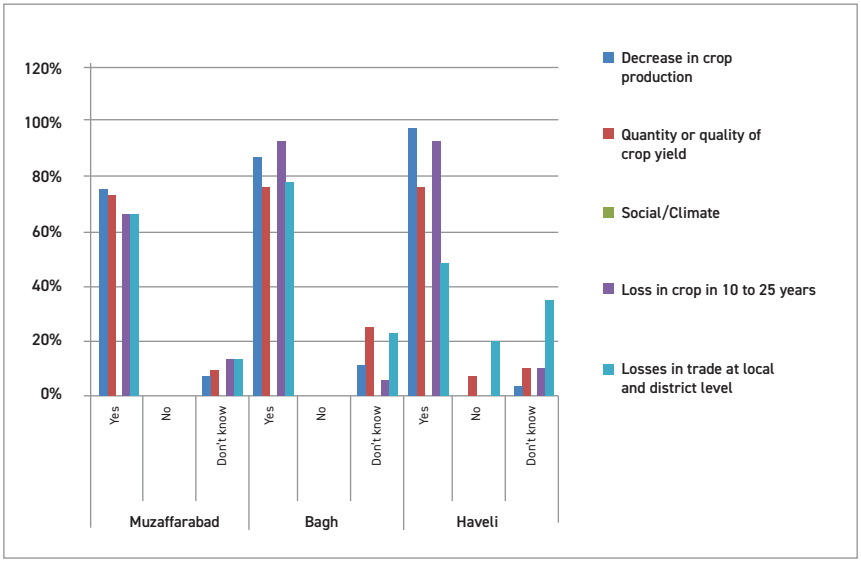


Figure 16: Impact of climate change on the crop production and agricultural trade

4.2 Responses of the stakeholders

As per requirement of the study, 29 meetings were held with the available management of the relevant Departments in the target Districts, civil society organizations, knowledgeable individuals and communities with members from all age groups and gender and peoples with disabilities in the selected villages with respect to climate change. The objectives were to know and record their observations/opinions and responses. While the meetings with the Line Departments were more focused on issues related to existing or potential policies, implementations of various plans and minimization of the negative impacts of climate change, the meetings with community, civil society organizations and individuals were more oriented towards knowing the people's perception of climate change, their observations on what has changed with what impacts, and any indigenous knowledge or practices that they know, and which can help the people survival in response to the negative impacts of climate change, especially related to the sources of their livelihood and drinking and irrigation water, help people improve their agricultural production system and bring positive changes in the life style of the people. The list of people with their designations consulted during the data collection is annexed as Annex-II. The responses were as under:

4.2.1 Department of Agriculture

While totally ignorant of the formulation or existence of the State Climate Change Policy, Strategy or Action Plan, the department has drafted an independent Agriculture Policy and Land Act which are in the process of approval by the competent authority. The draft policy suggests developing climate resilient species, drip irrigation and line sowing with multiple cropping systems. The use of pesticides is being discouraged except the ones that are less or not harmful to the environment.

The current changes in climate and its impacts were elaborated by lesser amount of snowfall in the foot hills and irregular pattern of rainfall, as compared to the recent past. This was further elaborated by an example of the Bagh district where drought was observed between 20th March to 15 June 2022 and which was followed by the sudden and heavy pre monsoon, monsoon and post monsoon rains, causing severe damages to the crops and properties.

Sundi (stalk borer) is damaging the maize crop, causing almost 30% less production in Bagh.

Parthenium (Gajar Booti) has invaded and covered a vast area impacting the growth of other agricultural crops. Although physical removal or the use of a pesticide, Glysophate mixed with water are the possible remedies for the control of this invasive plant, either need comprehensive campaigns, never demonstrated or replicated so

far. Biological control of Gajar Booti (Parthinium) was indicated to be underway in coordination with Forest and Livestock departments.

The population of Wild boar has been increased with a negative impact on the production of agricultural cops, especially the standing maize crop. Placing baits, mixed with Zinc phosphate on the entry points of the hiding places of wild boar or just shooting them dead were indicated as the possible and only remedies but never tried so far to control the wild boar population.

An Agriculture calendar exists but needs to be reviewed and modified in light of the changed climate scenario.

The small-scale experiments on Multi cropping system and line sowing has given better results in the crop production but needs to be adapted on field scale. Needful awareness has to be generated for it to be successful

Extension services are now improved and every Monday has been fixed for meeting the farmers and resolving their issues.

Climate change impact is more visible on seasonal rain pattern and temperature that has negatively impacted the maize crop with overall drop in the production by almost 30%.

Increased human population has caused reduction in per capita Land holdings and consequent reduction in production that has forced the farmers to adopt alternate professions with reduced risks.

Although there has never been any formal discussion within the department or with the communities on climate change, the impacts of climate change have often been shared with participants of the local and national workshops. Similarly, there has been no specific or targeted research, ever undertaken by the department exclusively or in collaboration with other institutions. The lack of awareness and inter-departmental coordination is the main reason. Coordination with other management departments or the universities for getting research done on issues of concern was minimum though one Ph.D. thesis was supported on Statistical modeling.

4.2.2 Livestock and Dairy Development Department

Methane gas being generated by animal dung is contributing to climate change. If more productive animals are introduced with less in numbers, that will decrease the impact of the emission of methane gas in the atmosphere. Biogas plants can also be established to the benefit of the environment.

The department plans to introduce the animal breeds that are more productive. Accordingly fewer animals shall be required to meet the needful income thus larger

herds could be avoided. This will have a direct effect on the production of Methane gas from animal dung which is contributing to climate change.

New breed of South Frizzier and North Gersy (F1) have been introduced in AJK after the environmental and area suitability study which is comparatively more productive in addition to being more resistant to hot weather and infestation by ticks and also with lesser in-breeding problems.

Lumpy skin disease is probably the one linked to climate change. It reached AJK through import of animals from Punjab. However, the protection of animals from such disease is possible through vaccination which is 100% successful.

Lumpy skin disease, which is a viral problem, has become rather common but the required research studies are still in-sufficient. In order to reduce the emission of Methane gas better farm management and more Biogas plants are needed.

It was further indicated that the number of domestic animals has been increased by 10-20% in Haveli district.

4.2.3 Wildlife & Fisheries Department

Major changes that are being felt due to climate change include the reduction in snowfall, irregular/erratic rains, harsh heat waves and extreme cold, marked reduction in surface water and shrinkage of natural springs.

As one of the biological indicators, the Jungle crow has been replaced in their traditional habitats by the house crow. In addition, several types of butterflies, Bees and other pollinators that were common about 10 years ago, are disappearing fast.

Wild boars that were confined to low lying areas before has suddenly increased in number in whole of AJK and causing severe damages to various crops with obvious impacts on the food security.

Climate change policy was prepared by Climate Change Cell under P&D department and copies were provided to us along with Strategy and Action Plan. The AJK Department of Fisheries and Wildlife is following the findings of the Policy but the Central Action Committee that was formulated to oversee the implementation of the approved policy is now nonfunctional.

Habitat of the mountain species is changing with shift in altitudinal movements of the wildlife which may affect their physiology, and also the breeding and other behaviors.

4.2.4 Forest Department

The Climate Change Policy, Strategy and Action Plans were prepared by the P &

Department during 2017 and were approved in 2019. The copies were provided to our Department. Department has initiated a very big Project of TTBT for 10 years under this policy through the PSDP funding. Farm Forestry has been initiated successfully with encouraging progress. Mostly fast growing exotic and local plant species are being planted under this project both on the Government and private lands to meet the future energy demand of AJK. Robinia, Ailianthus and Poplar are more successfully planted. A new Latin species Pinus greggii was tried as fast-growing pine tree but for various reasons it could not prove successful in this climatic zone.

Although a comprehensive research might be needed, the seeds of Silver Fir has lost its viability in nurseries as well as in nature. It is generally being believed that all this is because of climate change.

The incidence of forest fires in the Chir Pine and scrub zone has increased for the last 10 years most probably due to long drought period as a result of climate change

Fir trees are getting replaced by the Blue pine and the Kail zone is moving up. This might be due to increase in temperature and low altitude species get required temperature at high altitude, hence plants species upward migration was observed as a result of climate change.

A significant change in the rains, snowfall, and heat waves pattern due to climate change have been witnessed during last 15 -25 years.

Communities are complaining about the absence of any mitigation plan for Climate Change.

The Haveli Forests are doing better in terms of the regeneration as compared to before but we can't assign any reason to it. Less understanding at Departmental level regarding Forest policy/ Act or document to cater the issues of climate change.

4.2.5 Health Department

Although not based on our research, Covid19 and dengue are likely to increase under the temperature ranging from 18oC to 32oC, which has already reached or approaching rapidly.

Cough and chest diseases in children have been increased to an alarming level, perhaps due to changes in weather pattern, associated with climate change.

Health education is carried out through the medical camps. Quarterly meetings are conducted with DG on epidemic disease like, Leprosy, Tuberculosis etc. to discuss and know the current status and remedies.

An efficient system of health care is in place in the AJK. Primary health care is taken

up by the Lady Health Workers that is followed technically by a Lady Health Visitor, and subsequently followed by a Lady Health Supervisor.

The Health Education Officer makes a visit once in a month while the Medical Officer twice a month at school level. Contingency Plans are reviewed annually to follow up on the seasonal diseases.

4.2.6 Public Health Engineering Department (PHED)

The Surface water has been decreased over the last 10 years mainly because of the lesser snow in the catchment, enhanced evaporation due to increase in temperature, and lesser percolation of precipitation due to deforestation and enhanced run-off. Over and above this, there is no control over the ascending population for housing and settlement on mountain slopes and upper reaches and, in the process, cutting and clearing forests thus causing more run-off, land denudation, flooding etc.

Due to lack of inter and intra departmental coordination, the planning process has been weak, further worsened by lack of research and a data bank that may tell of what quantity and quality did we have in the past and where do we stand now? Although a common problem with almost all departments, relevant to climate change, the PHED being the one responsible for the supply of water to public at large, there must have been a comprehensive strategy for water conservation at both supply and consumer ends. The selected districts being using the surface water for all their needs, there are not much information if the ground water level has dropped off, and if yes, at what rate?

The department has built up reasonably good facilities of water storage at appropriate points to facilitate the consumers but apparently, there has been no agreements or understanding with the users on the sustainability aspects of such facilities. The irresponsible water uses, causing tremendous wastage may certainly create a big crisis in the future that may become a problem, hard to resolve. Similarly, the drains are being obstructed and their routes disturbed that causes immense damages during heavy rains that have become now a routine. Greater water supply system is in place for Bagh city with a plan of its extension but it has to be made sustainable right away.

The water supply in Muzaffarabad City is affected by the diversion of River Neelum at Noseri, making the release of water as lesser than the agreed quantity. Water treatment is efficient and microbiological and chemical tests are carried out at the pumping source in Makri on regular basis. About 10 million gallons of clean water is supplied to the city from Nisar Camp to Shifa Eye Hospital

There are 25 natural springs in Muzaffarabad but the water of only two of them is drinkable, all others are contaminated. The status of uses of such springs and their health impacts on users have not been studied yet.

4.2.7 Environmental Protection Agency (Climate Change cell)

Climate Change Policy, Strategy and Action Plans were prepared through the Asian Development Bank (ADB) assistance and copies were distributed to the focal persons of all relevant departments for implementation. A climate change cell was also established for coordination with relevant departments with a climate change committee. Unfortunately, due to certain known and unknown reasons, the cell was abandoned with direct impact on the functioning of the committee and its coordination role. As a result of such disaster at institution level, nothing could be achieved in the form of progress that was envisaged as part of the climate change policy, strategy or action plans done with tremendous financial inputs and efforts of consultants and representatives of the most relevant departments. For example, 125 projects were identified as part of the implementation of the climate change policy but not even a single could be prepared and implemented.

The Departments have also been slow or even stagnant to show any progress on the implementation of the approved Policy and strategy. There might be staff in any of the Government or Non-Government institutions in AJK that might help and facilitate the line departments in the preparation and implementation of the climate related projects but whom to co-ordinate?

4.2.8 Planning & Development (PnD)

Climate Change Policy. Strategy and Action Plan were prepared under the Climate Change Cell in the P&D with the financial help of ADB and technical help of consultants and Reps of line Departments. The process went smooth and the documents were prepared with-in the stipulated time and to the satisfaction of all participants. Next was to provide hard copies to all participating Departments for them to prepare and adopt an implementation plan with coordination from the climate change cell. Even an Implementation Committee was established under the Chairmanship of ACS Dev. Unfortunately, the Climate Change Cell was closed and no funds were available for the follow up of the strategy. The concerned Departments also lost their interest and became non-concerned to the extent that some of them even do deny of having received a copy of the document, and consequently, no further plan or project, no funding, no implementation, no monitoring of any nature and so on.

The Policy was framed with other support documents for 10 years (2019-2029), out of these; four years have already been passed without having done anything related to climate change.

4.2.9 Social Welfare Department

The impacts of climate change have become so obvious that in the year 2022, the spring and autumn seasons disappeared and got merged with summer and winter. The Incidents of cloud bursts have also been increased with stronger winds and more frequent and stronger hailstorms. Spring water has decreased, affecting the production of crop and consequently the livelihood options and opportunities. The existing situation has directly impacted the intensity of child and women labor which may further intensify in the future.

4.2.10 UNICEF

There is marked drop in livelihood opportunities and increased trend in migration towards cities, perhaps one of the reasons in enhanced begging activity and child labor. With increased poultry diseases, there is reduced poultry production. Combined with reduced agriculture production, the commodity prices have been increased tremendously that has affected the livelihood opportunities for everyone.

4.2.11 State Disaster Management Authority (SDMA)

Climate Change did cause a heat wave of 45oC during June 2022. The spring and autumn seasons have almost disappeared with winter followed immediately by the summer.

Snow fall was unusually witnessed in the month of June in the Neelum Valley with a drastic negative impact on livestock. About 700 goats and sheep died due to this sudden fall in temperature at Neelum Valley especially village Dowarian and Jagran alone.

Historic increase in forest fire was noticed in 2022 in a dry spell from March 20th to June 15.

Heavy Monsoon showers poured down after the drought and caused huge damage in the Southern region of Pakistan making about 30 million people homeless, loss of 1700 lives and loss to property and agriculture. Food security is still at the level of life risk.

Climate change phenomenon is setting a new record with its impact far visible in the last 5 years.Mitigation measures as suggested in the approved Climate change policy must be undertaken to overcome the more drastic impacts that are expected in the near future. Since cloud bursts have become rather common, the marginal lands should be evacuated to minimize the property and life losses

Increasing the green cover is one of the established way to address the issue of more summer heat. This needs to be increased even in the urban areas.

Gojra Nalla span was 300 meters before but now squeezed to less than 10 meters. Unless such cases are taken up and the reasons are explored, remedies shall not be possible

In order to avoid people going uphill for settlements, thus destroying the critical watersheds, building roads on the mountain landscape without proper Environmental Impact Assessment (EIA) should not be allowed

To ensure mitigation and adaptation plans for climate change, a rather stronger political commitment is required.

4.2.12 University of Azad Jammu & Kashmir Muzaffarabad

The relevant institutions may get stronger provided the universities produce the required number of skilled graduates in the desired discipline. Unfortunately, there is no separate department that teaches the subject of climatology, rather it is covered partially by the Zoology and Botany Departments. The coordination with the relevant departments within the university is either weak or missing altogether.

There is no research initiated on the management issues of the relevant departments. Coordination mechanism is missing between the Universities and the management departments.

Some technical papers are produced on the Impact of Climate Change on Biodiversity by Prof. Sadique but these lack implementation by relevant departments

Management based research is very important for the State but almost missing. A proper medium is needed to facilitate the university scholars for initiating it, finding and providing the needful financial and logistic support for the students. The President Office can play a vital role in developing a coordination mechanism between the management departments and the research scholars of the Universities of AJK.

4.2.13 Local Government and Rural Development Department - Bagh

As compared to the past, most of the water bodies have either been dried up or drying quickly. Moreover the run-off has increased due to concrete buildings and paved roads with negligible percolation to feed the aquifers.

4.2.14 Print and Electronic Media

Though with a reasonably good Media coverage on day to day issues, there is no rational set of strategies for addressing the issues of climate change in the perspectives of nature and human ecology

Any NGO or experts like Mr. Ashiq Ahmad Khan and Mr. Yousaf Qureshi can design the guidelines for the media to work on the issue of climate change.

Media has responded quite aggressively to the issues of heat wave, drought, heavy rains, floods and life losses because of any medical reason or a climatic epidemic.

The present issues of population explosion, reduction in cultivable land, and change in climate are the biggest threats to the food security in AJK. Media can play its role of awareness in the society to cope with this if supported by the Government, NGOs and experts in the field.

4.2.15 Government official

While working as Secretary Agriculture, we tried to grow wheat in the Leepa valley as an attempt to see if the local climate has changed to support a crop like wheat which was not possible to be grown because of lower temperatures in the past. To our surprise, the trial was successful with the major reason of changes in the snow fall pattern and consequent increase in temperature. A comprehensive follow up is required

To seek better economic opportunities, people have started shifting from rural to urban areas. The trend has increased much faster now than before. This has been mainly because of the enhanced population pressures on the already limited land holdings and climatic factors affecting the production of agricultural crops. There has been a drastic reduction of about 30% in agricultural produce.

Another climate change impact has been noticed in Poonch area where Shisham (Dalbergia sissoo) tree species have now ascended to higher altitudes, occupying some of the areas, previously only under the pine forests.

Because of more area now under concrete, the water recharge of the aquifers has declined while the natural springs have started drying up. The level of water contamination has gone up due to poor sewerage system.

Land use enactment is urgently required to check the emergence of housing societies over the productive land.

4.2.16 Individual professional herder

With climate change as one of the strongest possibilities, the green pastures of the past have now been deteriorated to various extents both at low and higher altitudes. Goglu, a less nutritional grass, is dominating and replacing the nourishing Chrysopogan sp.

Bakarwals are facing extreme difficulty in moving their herds from low land to the alpine pastures because of more areas coming under closures by the Forest department.

For certain unknown reasons, the density of Guch (Vibernum nervosum) has drastically been reduced and, apparently, this shrub is on its way out of its traditional habitats.

4.2.17 Civil Society

4.2.17.1 Group Meeting at Haveli

Jungle crow has been a common bird of Haveli which has now been replaced by House crow, a bird of low altitudes. While a new bird that has yet to be identified has appeared and seen quite frequently. This bird was not seen before perhaps because of the then colder environment as compared to now

The population of Domestic animals, especially cows and buffaloes have increased by 20% in number. For certain constraints in practices related to feeding livestock on the pastures, stall feeding has become rather popular. Very little or no knowledge of climate change impacts on the livelihood. Springs water are drying up. Snow fall has decreased, but erratic rains have increased.

4.2.17.2 Group Meeting at Bagh

Landholdings per family have become so small that the agriculture farming and animal husbandry are not economical anymore. People do migrate to valleys below for their livelihood. Support of the Government department is also insufficient. Seeds are not good with resultant crop being poor and consequently, there is a decrease in production by about 30%. There is no alternate for the fuel wood. Gas and electricity are expensive so people cut the forests

4.2.17.3 Group meeting at Pattika (Muzaffarabad)

With growth in population, more land is being occupied by the houses with subsequent shrinkage of the available agricultural land and consequent reduction in the production of crops, vegetables and fruits.

With less production capacities of agricultural land and consequent reduction in the

income, the people have started migration to larger cities for employment, business etc. that have generated new problems for the cities. Even the people left behind have lost interest in the farming profession. The situation has further been aggravated because of the appearance of a borer that is affecting the maize crop. Consequently most of the farmers have left growing the maize crop that might affect the food security in the far future if not right away. The recent earth quake has molded the behaviors and attitudes in such a way that most of the good farmers of the past have abandoned farming as a profession.

4.3 Consultative Meeting with Key stakeholder – Govt. Line Departments

A consultative meeting was conducted under the chairmanship of Secretary Agriculture, Animal Husbandry and Irrigation Departments represented by the officers of the concerned Line Departments, Un Agencies and Civil Society Organizations, Islamic Relief Pakistan and the consultant team members. A presentation was delivered to the group by the consultant team to briefed about the impacts of the climate change on water resources and livelihood in local scenario, global concerns and responsibilities of the relevant departments, communities and NGOs for taking mitigation adaptive measures and take timely actions to cope with the impacts of the climate change in future and reduce the risk of food security, improve the livelihood opportunities and meet the water depletion conditions in the area. The views of the participants are given in Annex-III of the report.

4.4 State institutions and climate change policy

The state of Azad Jammu and Kashmir has successfully formulated a climate change Policy in the form of a comprehensive document with the support of ADB and relevant departments. Not only this, the policy has been translated further to various strategies, elaborated further with an action plan, covering 14 management departments. The policy and strategy formulation were not done in isolation rather it was ensured that the focal person of each of the relevant departments is part of it and the department's consent is available on each of the actions suggested by the policy and strategic documents. Moreover, as a basic requirement, the policy document is further supported by an implementation plan with a time period of 10 years, 2019-2029. All this has been approved by the Government of AJK

The retirement or absence of the focal persons in the departments and discontinuity of the meetings by the central forum has brought all these documents to dormancy. Most of the officials haven't even seen these documents now. Out of 14 departments only 3(Climate Change cell of Environmental protection Agency, Wildlife and Fisheries

and Forest) were aware of the existence of a climate change policy with only two management departments (Forest, Wildlife & Fisheries) that has implemented some of the proposed actions for which the money was available. Agriculture Department is even in the process of formulating a policy for their own departments that, according to its senior management, shall cover all aspects of agriculture though not sure if climate change mitigation and adaptation will be a part of it. They are doing it without even knowing that they already have a climate change policy that is waiting for more than 3 years for them to implement. In fact, out of a total 10 years for implementation, more than 3 years are already gone without any activity.

The oldest university of AJK with thousands of students in the BS programs, hundreds in the Masters and scores of students in the MPhil and PhD programs is totally ignorant of any climate change policy. According to the Registrar and a few senior faculty members, someone might have participated in the workshops or meetings related to the climate change policy but such documents, if any, were not shared with the rest of their colleagues nor did someone from the Focal Government Department ever ask about it. They do teach the subjects that mention the climate change issue but not to the depth of it. They further told that they are not aware of any PhD scholar, undertaking his/her thesis on climate change and negative impacts on livelihoods and food security.

The other management departments also stand almost at same level in the context of the State's approved climate change policy, the proposed strategies and action plans.

A wide collaboration gap exists between the management departments and the universities of AJK. This gap alone is a shocking indicator of the unsustainable management approaches of the state's resources since none of the management decisions is based on the research solution that must obviously be the needful strategy for the management of natural resources.

4.5 Key Findings of the Study

While knowing that the world at large is concerned about the negative impacts of the climate change, Pakistan though second last in contributing to it, is 5th amongst the sufferers, however is not doing enough to cope with the threats that are potentially on the constant increase. Poor economy, weaker institutions, less informed farmers, the least concerned scientists having limited capacities to undertake field-based research and the lack of political will and stability are some of the major factors that are contributing to our attitudes towards climate change and our inabilities to focus on climate mitigation and adaptations.

In continuation with the process of climate change policy by the Federal Government of Pakistan that has already been done with, the State of Azad Jammu and Kashmir

got its climate change policy in 2015-16 with implementation scheduled for 2019-2029. However, unfortunately, neither the implementation was taken serious by the majority of the Departments nor anything better in the form of positive response to the negative influences of climate change is visible anywhere due to reasons given earlier.

While the situation of climate change and the inadequate response by the primary stakeholders are being felt widely, there has not been any specific study that could assess the current situation of climate change and chalk out certain doable recommendations. While contributing a bit to such gaps, the findings of the present study are as under:

4.5.1 Rural communities and district offices in selected districts

i) While the farmer community do see their crops being less productive as compared to a few decades earlier, their fruits are more infested with pests and diseases, and vegetables poorer in quality and quantity, they have many more reasons to believe causing this. In fact, climate change is held responsible, if at all, to a level of 5-10% in the form of seasons minus autumn and spring, erratic rains, dry months, and hail storms while non availability of good seeds, expensive fertilizers, inadequate irrigation water etc. are held more responsible for the problems. Even if they see a problem related to climate change, they are unable to link it to any knowledge or practice that might have been in use in the past in the form of indigenous knowledge or practices that might help even now if revived to cope with the negative influences of climate change.

ii) The people, though sure of the changes in the raining pattern, erratic rains, increased number of hotter days, hailstorms and lesser snow that are disturbing their cropping pattern, they have little understanding and zero awareness of what to do or what to change? The majority even don't know where to go and whom to contact to seek guidance from?

iii) While there were a few progressive farmers who did dare to go for alternate crops with useful results, majority are scared of changing anything because of the fear that this may cause unaffordable losses especially when there is no demonstration of alternate cropping being more productive by the relevant Department.

iv) The Agriculture Department, being the most relevant Department to help sustain the farmers livelihoods is apparently less informed of the existence of an approved climate change policy, needful strategies that are relevant to Agriculture Department and the action plan that the Department has to implement. Accordingly to fill this potential gap, they have tried to develop one of their own. The draft is ready to be submitted to the relevant authorities for finalizing it and

granting approval.

Irrespective of whether the Agriculture Department finds resources to implement the State approved climate change policy or the one they are in process to finalize, the department has to ensure food availability, security and sustainability. This is the main agenda they have to follow.

The department is lucky to have a research wing with qualified staff who do understand the issues, but have lesser resources and capacities to reach everywhere in the state and district. Moreover, the Extension wing of the Agriculture Department has been, and still doing certain useful efforts in the form of testing alternate crops, growing multiple crops, publishing the awareness materials etc. majority in the target community are not aware of it. There being no research Centre that is exclusively working on climate change issues at the district levels with the capacities and arrangements to share the results and findings of their or someone else's research on adaptation on larger scale with the stakeholder community, especially those in the remote locations who suffer more, the situation may not only remain unchanged but further deteriorates with the passage of time and adds to the factors causing climate change.

v) The Gajar Booti (Parthenium), being rightly identified to be seriously invasive and damaging to the agricultural crops with rapid spreading capacity, is still not being attended for practical eradication to the "below economic injury level". The species has appeared and spread widely within a decade and a half, and now seen in abundance in all of the 3 target districts of the study. There is no reason known of its invasion in the State. The climate change may be one of the reasons behind it but there has to be enough scientific reason to say it. The Extension wing of the Bagh Agriculture Department has published the brochures and leaflets for the awareness of general public that recommends certain remedial measures but due to various reasons, is hard to see any campaign being run anywhere for the eradication of a species that may become the most serious issue in the near future. There is no demonstration site where people can see the various eradication techniques being applied for people to adapt and replicate, and get rid of this seriously threatening species.

vi) The Livestock and Dairy Development Department is working on the introduction of new breeds of animals with increased production level of meat and milk. Inaccessibility and limited transport and financial resources are the major obstacle in the success of this type of projects in the remotely lying areas.

Lumpy skin disease appeared in AJK in the recent past and is probably the one linked to climate change. It reached AJK through import of animals from Punjab. However, the protection of animals from such disease is possible through vaccination which is 100% successful as per claim of the department. There has

been a difference in opinion about the full control of this disease but still it is an appreciable effort.

Introduction of new improved breeds of animal can reduce the population of animals with improved quality of dairy and meat production and this will reduce the quantity of cow dung which is causing the emission of methane gas in the atmosphere causing climatic problems. More research based approach is required for the livestock and poultry department of AJK to meet the future demand of animal related food and reduce the livelihood issues.

vii) While discussing the climate change issue with relevant staff of the Government Departments, there were certain information that were required from other departments to get a clearer picture of what is happening to the Natural Resources because of the negative influences of climate change, however, there being no inter-Departmental coordination mechanism and even aptitude for it, there were serious gaps in the available information. Even if a department is serious to develop a coping strategy, it does need information from other departments. With no culture of sharing information, none of the departments might be in a position to work out and implement a doable strategy, even if they want to. Climate Change Mitigation Policy, although developed at state level, with a strategy and Action Plan, majority of the professional staff of the relevant departments have neither seen it nor heard about it. The policy may not be that good in all respects but that could only be determined if wholly or partially implemented. Negligible progress on the implementation fronts has so far been observed. Further delay in the implementation of the approved policy at State level may have serious consequences for the people of AJK with respect to food security and sustainability.

viii) Data deficiency is another serious issue. While the dams and met Department may have data regarding the inputs and discharge of water, other management departments lack not only the true and updated scientific data but the existing gaps in the system for them to use in managing the land and water resources at local, district and State level.

Data is required to determine the current status of natural resources and trends, negative or positive. A remedy for any issue may only be diagnosed if data is available. For example, climate change is showing up, affecting the management targets of all management departments. However, none of the departments is in a position to claim that the statement about a climate change problem is based on scientific investigation, and is being supported by relevant data. Comparative figures for different years, being lacking, pose a problem in the analysis of the situation for determining the future of a problem. The approved climate change policy also emphasizes it in various forms.

Without proper data, neither the production levels could be judged and compared, nor the quantity and quality of surface water is determined. It is generally believed that almost 30 % more land is now available to grow crops because of the reduction in snow on higher altitudes and consequent increase in temperatures but nothing is available in the form of data that how much snow was received in a particular year with what impacts on the flow of surface water and with what impacts on the end users. Nothing is known of which seeds were sown under which altitudes with what level of production and has there been any change with the change in seed source? No data is available on production level of various crops and fruits, corresponding to meteorological data. All such data is the basic requirement for devising a coping strategy for the climate change.

ix) Availability of food for the growing population and its sustenance and security through the years to come are linked to the availability of natural resources and availability of livelihood options and opportunities which demand a strong focus on the health of the respective ecosystems, their protection against the degradation forces and the ecosystem restoration, if damaged. It's only then that the free natural ecosystem services shall be available to ensure food security. Unfortunately, none of the ecosystems in AJK in general and the target districts in particular are seen in even near to perfect condition. The tragedy is that neither this is being realized by the people nor the management departments. Any good practice such as afforestation even if adopted, is done in isolation and is not linked to the overall restoration process of an ecosystem.

x) Pollinators are precious part of our ecosystems. Up to 70% of the crops are being pollinated by the tiny insects such as bees and butterflies, some birds and small mammals (Brianna Ranndal. The value of Birds and Bees-NRCS Working Lands for Wildlife June22, 2020). The unwise uses of pesticides have almost wiped out most of the beneficial insects, pollinators in particular. Their consequences may already have shown up in the form of reduced or no production in certain areas that might have gone unnoticed because of the lack of research. The pesticides shops are everywhere who sell even chlorinated hydrocarbons without any check from the relevant departments. The people being only concerned with the eradication of pests damaging their crops, fruits or vegetables have no idea of how many other beneficial insects are being destroyed in the practice. Coupled with climate change, the consequences could be horrible.

xi) Each ecosystem has a minimum of one university with scores of MSc, MPhil and PhD scholars. They all have to write a research paper or a dissertation as part of the completion of their courses. However, being ignorant of what problems and issues are there at field level, the scholars may take up assignments which may have some academic value but no practical uses. Similarly, each of the

management Departments has scores of management issues that need research solution as a basis of sustainable management solution. However, since there is no coordination between the universities and the management Departments, the issues remain as such and grow further with time, impacting adversely the health of ecosystems, crops and food and, consequently the water security.

xii) The availability and quality of water has been reduced with 30% reduction being indicated by people and the relevant departments. While reduction in snow could be the primary climatic factor, over consumption and wastage of water by the consumers and water supply schemes are other problems that need to be addressed seriously

xiii) Low agricultural production (almost 30% reduced as per the statements of the community members, some staff members of the department and evidence of the field visits) and climate change impacts have forced the mountain communities to migrate down to the big cities of AJK and Pakistan and some prefer to go abroad, especially to the Middle East, for better income opportunities for them and their families. Migration of big part of the working-class contributes enormously to the low and poor agriculture practices that in turn becomes the main reason for the drop in agriculture production.

xiv) The land use policy is missing in AJK. Rural communities seldom care about the construction of houses in colonies. Mostly the single houses are constructed on the fertile agriculture land, so the productive land is squeezing. Similarly, the new housing societies, like in Lagarpura and Thotha in Muzaffarabad are established even with the Government support, on the very fertile lands causing loss in agricultural produce.

5. A frame work for the issues, proposed remedies, responsibilities and time frame.

It may be useful if the following remedies are adapted and regularly monitored for the issues coming up due to climate change and other disasters:

Table 2- Proposed issue and remedies

Issue	Proposed Remedies	Responsibility	Time frame
Lack of coordination and monitoring with respect to the implementation of the approved climate change policy	P&D may restore the climate change cell and house it back in the P&D	P&D	Within One month
Lack of knowledge about the approved policy documents	The relevant departments must depute staff to be trained on the contents of the policy documents	Head of the departments, Climate Change Cell	2023
Implementation of Climate Change Policy, adaptation of strategy and Action plan	The staff, trained on the concept and contents of the policy documents may prepare projects as proposed in the action plans.	Trained staff, under the supervision of the Heads of Departments	2023-continue
Lack of management-based Research on climate change issues	Develop coordination between the Universities and management departments	Climate change center in the P&D; Registrars, and heads of the line departments	2023 continue
Lack of support for local communities to adopt the coping strategies	A network of demonstration sites, training workshops and availability of guides for communities to learn from.	Heads and relevant support staff of Agriculture and Livestock departments	Continue
Collection and maintenance of data related to production, losses and damages due to natural or other disasters	Establish a data recording cell, with staff properly trained	All departments of natural resources and livelihood (Agriculture, Livestock, Forest, Fisheries, SDMA)	continue
Identification of needful intervention to cope with the impact of climate change	Department should identify the needful intervention to overcome the negative impacts of disasters /climate change and recommend to the Apex body for change in policy accordingly	All line departments dealing with livelihood and water resources	Continue
Mapping of critical ecosystems which are liable to be affected by the negative impacts of climate change	All critical ecosystems must be identified, delineated on map and a management plan prepared for each, focusing on the restoration of their degraded segment(s).	Agriculture, Forest, Livestock, Fisheries & Wildlife departments	Continue
Ecosystem governance plan to mitigate the disasters due to climate change and others	Preparation of Ecosystem Governance Plan to ensures the security and sustainability of food, water, and other livelihoods against all of the arts, including climate change.	All public and private stakeholders	continue
Reduction in productivity of Black Mushroom due to upward shift of snow line caused by climate change	Artificial propagation of black mushroom should be initiated to meet the livelihood opportunities of the communities	Forest department	Continue
Land wastage and under utilization	Barren lands must be utilized to meet the livelihood needs keeping in view the climate change scenario	Agriculture, Livestock and Forest department	Continue
Proper management of protected Areas network to cope with the climate change impacts	Management plans for Biosphere Reserve, national parks, Game reserves and Wildlife sanctuary should be developed and implemented	Forest, Wildlife & Fisheries Department	2023-24
Wastage of water in urban water supply system causing health issues	Ensure safe water supply system in the urban areas and control open runoff water in the streets.	Public Health Engineering department	Continue

Establishment of water filtration plants and water testing laboratories in the cities	Water filtration plants should be established in all big cities of the state and ensure their repair and maintenance. Similarly water testing laboratories should be established and maintained properly	Public Health Engineering department, local government and EPA	Continue
Increase in vegetative Cover to mitigate the climate change impact	Plantation should be carried out extensively and conservation of the existing forests and green cover must be ensured	Forest, Agriculture department	Continue
Solid waste management causing environmental hazard	The municipal institutions should be trained for the proper disposal and management of solid waste from the cities	Local government and urban municipalities, EPA	Continue
Gap of coordination between the Research Institutes and the management departments for exploring scientific approach t	Coordination should be developed between the research institutes and the management departments for exploring the appropriate scientific approach to address the impacts of climate change and other disasters	Line departments dealing with the natural resources, Universities, SDMA and EPA	Continue
Weak Community involvement and their Awareness about the climate change impacts and other disasters	Establish sufficient demonstration plots for community education and awareness to cope with the climate change impacts. Trained extension staff should deliver their services efficiently.	Agriculture, Forest departments	Continue
Proper utilization of indigenous knowledge to cope with the changing climatic conditions	A detailed study is required to dig out the indigenous knowledge of adapting the measures to cope with the climate change and disaster impacts	Agriculture and Forest departments	Continue
Diversion of stream water flow is causing serious climatic impacts on the local conditions	Downstream water lakes should be established as designed in the planning stage of the dam construction	WAPDA, EPA	Continue

6. Conclusions

- The State of AJK has a climate change policy with a strategy and action plan but, unfortunately, this has not been implemented even to 5% in the last more than 3 years. Approved implementation of the policy has been started in 2019 and shall end in 2029.
- Climate change is showing up. People do feel that there is something abnormal that is affecting hard their crops, water and livelihoods with possibility of serious implications for their food security in the short, mid and long term which must be of immediate and urgent concern to policy makers and this was because of this that a policy document was prepared by investing a huge sum of money and efforts, however, it couldn't be implemented. Climate impacts and low land productivity has forced the mountain people to migrate from rural to urban areas that too has serious implications.
- Overall capacities of various departments in the AJK at all levels in tackling climate change issues is either lacking in total or exists with a rudimentary status. The availability of sufficient, qualified and trained staff in the field of climate change is the biggest challenge for all of the management departments, especially the universities which are supposed to produce trained manpower on regular basis that could run the management institutions, civil society organizations and could supervise the research scholars in pertinent fields.
- Inter-departmental and institutional coordination is crucial to the functioning of any system. This being lacking at large has far reaching impacts on the productivity of land and thus the food security for the people of AJK.
- Ecosystem governance is basic to make sure that the ecosystems of AJK are healthy, the natural resources are safe from being degraded and their management is sustainable while, at the same time, the free ecosystem services in the form of water, forage, forests, wildlife, healthy crops etc. are available to the people of AJK. However, though the institutions are available with sufficient funding to run their day-to-day affairs but apparently, due to the lack of understanding and focus, the ecosystems are constantly being ignored and thus degraded with the process being further enhanced due to climate change. Although maintaining a healthy ecosystem is much cheaper through effective governance than restoring it once the process of degradation starts, effective level of governance is lacking. The concept of ecosystem governance has been applied though on a smaller scale through the establishment of protected areas and the declaration of the entire Neelum District as a Biosphere Reserve, the lack of adequate financial and human resources and lack of coordination among departments and institutions remained to be the biggest barrier for these not to work.

7. References

i. FAO 2012 Climate Change Adaptation and Mitigation: Changes and opportunities in the food sector Rome: Food and Agriculture Organization of United Nations.

ii. Ministry of Climate Change- Climate Change Policy of Pakistan

iii. Environmental Protection Agency of AJK-Climate Change Policy of AJK

iv. Environmental Protection Agency of AJK-Climate Change strategy of AJK

v. Environmental Protection Agency of AJK-Climate Change Action Plan of AJK

vi. Prof. Dr. M. Siddique -Khabarnama press article-Azad Kashmir main Almi Maholiati tabdili ke janglat, Jangli Hayat aur Insani Sehat per asrat-

vii. Prof. Dr. M. Siddique, Sardar M. Akram- DFO, Kh. Raesuldin -Tourism Department of AJK.-The Climate Voices from Azad Jammu & Kashmir.

viii. Planning and Development Department AJK- Statistical Data of AJK 2021.

ix. IUCN 2004. Sustainable Livelihood and climate Change Adaptation, review of a project on 'Climate Change, vulnerable communities and adaptation, Switzerland.

x. 2020 David Eckstein Global Climate Risk Index Germenwatch.

8. Annexures

Annex I: List of officials of the line departments and people consulted with their designations:

Sr #	Department/Discipline	Name	Designation
1	Agriculture Department	Mr. Tariq Bandey	Director General
		Mr. Masood Iqbal	Director
		Dr. Faisal Rahim	Director Seed
		Ms. Rahila Kh.	Planning Officer
		Nadeem Iqbal	Horticulturist
		Mohammad Zubair	Agriculture Officer
2	Forest Department	Mr. Gul Hussain Shah	Chief Conservator
		Mr. Sajid Nadeem,	DFO Haveli
		Sayed Tahir Ali Shah	DFO Bagh
3	Livestock Department	Dr. Ejaz,	Director General
		Dr. Manzoor	Veterinary Officer Haveli
4	Wildlife & Fisheries Department	Mr. Naeem Iftikhar Dar	Director
		Mr. Shakoor Katarya,	Deputy Director
		Mr. Sakhi Zaman	Deputy Director
5	Public Health Engineering Department	Mr. Tahir Muzaffar Malik	Ex. En Bagh
		Mr. Fahad Israr Awan	Ex. En Mzd.
6	Health Department	Mr. Zahid Awan	Planning officer
		Dr. Sayed Mohsin Ali	CMO Bagh
		Mr. Waqar Awan	Research Officer Mzd.
		Mr. Mohsin Bukhari	Revenue Officer Mzd.
7	Environmental protection Agency	Sardar Rafique Khan	Deputy Director
8	Planning & Development	Mr. Jamil Ahmed	Chief Planning Environment
9	Social Welfare	Mr. Abdul Wahid,	Director Mzd.
		Mr. shaukat Ali	Deputy Director Bagh
10	SDMA	Mr. Saeed Ur Rehman Qureshi,	Director Mzd.
		Mr. Muhammad Waqqas	Assistant Director Bagh
11	AJK University	Dr. Aeysha,	Registrar
		Dr. Siddique Awan,	Head of Zoology Dep.
		Dr Nuzhat Shafi	Zoology Dep.
		Dr. Nasira	Zoology Dep.
		Dr. Noman	Botany Dep.
12	Local Government	Arshad Ahmed Abbasi	Assistant Director
13	UNICEF	Shahid Mehmood Qureshi	Children Protection Coordinator
14	Media	Mr. Asif Raza Mir, Mr. Arif Urfi, Mr. Imtiaz Awan, Mr. Sajjad Mir and others.	Print and Electronic media representatives

13	Community Group Pattika		
14	Community Group Bagh		
15	Community Group Hallan Shumali Haveli		
16	Senior retired Bureaucrat	Sardar Abdul Raheem Khan	Secretary Agriculture (R)
17	Local Herder	Ch. Noor Mohammad	Bakarwal Pir Hasimar Area
18	Civil Society member Haveli	Mr. Khurshid Ahmed	Local resident of Haveli
19	Civil Society	Group meeting at Pattika (Muzaffarabad)	
20	Civil Society	Group meeting at Hallan Shumali (Haveli)	
21	Civil Society	Group meeting at Bagh	

Annex II

Presentation of the Study

Consultative Presentation was given by the consultant Mr. Ashiq Ahmad Khan and Mr. Mohammad Yousaf Qureshi, to the audience group of Stake holder departments and sponsors of the Study. Honorable Secretary of Agriculture, Animal Husbandry and Irrigation Department, Mr. Javaid Ayub chaired the event. The statements of the individuals are given as under:

Kh. Ejaz Hussain DG Irrigation:

There is a national program for ground water lifting through the application of solar energy source. Water storage and irrigation channel system should be done in close coordination of the relevant departments and the communities. There was a project of AJKRSP for the protection of the surface water and wise use of ground water. Irrigation Department will support the research activities conducted by the University scholars documenting the visible impacts of climate change on the water resources.

Mr. Ghulam Murtaza: Horticulture Officer

It is noticed that the mid-February flowering of plants and pollination is decreasing due to the climate change. About 29 spices of insect flies are found on the plants. Research Institute of the Agriculture Department is very small with limited capacity to conduct the research.

Mr. Zareen Khan: Director Agriculture

Practical observation shows that the valleys of higher altitudes can be brought under the wheat cultivation due to rising heat waves as a result of climate change. Well defined season is no more there. The climate change has supported the pests and their attacks have increased on the vast varieties of fruits, vegetables and crops. Off season production of vegetables is the solution for that Land Use Act and Policy are in the process of approval

Mr. Rashid Hussain; Planning and Development Department

Project has already been submitted in the current ADP to upgrade the Climate Cell but the Finance Department is reluctant for the approval of the additional staff. 17 proposals have been developed under the climate change policy.

Mr. Shahid Qureshi: UNICEF

The awareness level of the communities is very weak and limited. This may be disastrous for the food security and livelihood aspect during the coming 20-30 years.

Dr. Shahida Parveen: Food Security & Livelihood Specialist Islamic Relief

Communities, Non-government organizations and Government institutions should have a platform to work together. This threefold institutional arrangement will effectively address the challenge of climate change and other natural or manmade hazards and reduce the risk of food security in AJK.

At the moment we have no knowledge of our footings-where we are standing and how to address the climate emergency. Heat wave is increasing rapidly but preparedness is not existing. NGO role is very crucial and needs government support.

Mr. Akram Aziz: Regional Representatives PCRWR

The water shortage is increasing in the rural areas due to reduced flow of natural water channels and springs. PCRWR has conducted the studies and suggested two remedies for this

1. Introduction of Rain water harvesting techniques
2. Groundwater recharge through increase of wetlands

Mr. Naeem Iftikhar Dar: Director Wildlife & Fisheries

Adaptation is very important to cope with the climate change

Mr. Babar Minhas: Deputy Director Local Government & Rural Development

Ground water level has gone down, especially in the southern parts of AJK.

Community conflicts are arising due to water scarcity. Early preparedness is not enough to address the depleting water resources

Climate change impacts should be included in the curriculum of the education at school level. Political awareness should also be initiated at mass level. Adaptation measures should be taken to cope with the climate change scenario in all the fields which area liable to have impact.

Remarks of the Chair

Secretary Agriculture, Livestock, Small Dams and ESMA

Departments are planning to adapt such measures to mitigate the impacts of climate change, ensure the food security, better livelihood opportunities and depletion of water resources. The relevant departments are advised to initiate the productive research by themselves or by involving the research institutes, like universities to address the management issues due climatic or other disasters. The chair endorsed the outcome of the study and validated it.

The event ended with the Vote of thanks by Mr. Zeshan Maqbool Haidri, Area Program Manager Islamic Relief Pakistan.

Policy Paper on

"Increased Impacts of Climate Change on Water Resources and Livelihood in the Districts Muzaffarabad, Bagh and Haveli, AJK"

I. Introduction:

Climate change is a global issue alarmed since the 19th century by scientists with its obvious impacts felt in Pakistan for the last couple of decades in various forms, especially in the context of water, food security and livelihood. The situation might get worsened in the future. According to some of the predictions (Regional Circulation Model, for example), the mean annual temperature has been stipulated to increase by 1.4°C by 2030, 2.4°C by 2060 and 4.7°C by 2090 enhancing the community's vulnerability further to climate change.

Some of the sectors that are being visibly impacted by Climate change are biodiversity in general, agriculture, forestry, and water resources in particular with mild to serious consequences for animal husbandry, public health, energy and disasters of various nature, thus threatening the sustainable livelihood of the people.

This study was conducted in three districts, Muzaffarabad, Bagh and Haveli of AJK, to find out the negative impacts of climate change and suggest actions that help to cope with the present and future climate change challenges and threats.

The study focused on major issues at global, national and local levels and the role and responsibilities of important stakeholders.

II. Objectives:

The study was guided by the following objectives, determined by the IR that were further translated to local and global concerns to have a better understanding of the issues and come up with doable recommendations:

a. Establishing the Climate change impact research around livelihood, water, Biodiversity and ecosystem of the area in a scientific manner that is strongly coherent with field-driven indigenous knowledge.

b. Review existing sectoral policies/Acts, strategies, and action plans (Agriculture, Livestock, land use, Climate Change, Forest, Water) and their implementation in relation to the increasing impact of climate change, gaps identification and a way forward to establishing consistency and coherence backed by evidence, research and development.

c. Documenting the Climate change association with local weather patterns and weather events, their subsequent impacts on indigenous livelihood sources (local economy depends on) and gauging.

d. Demonstrated Shift in the livelihood patterns over the period of time (20 – 25 Years)

e. Create awareness among the public, and sensitize them, on how to maintain and improve existing livelihood practices, manage water resources and conserve the biodiversity of the area for the overall well-being of local people.

f. Develop a policy recommendation that will showcase a piece of information around prevailing major climate change impacts and appropriated preparedness, mitigation and adaptive measures that will contribute in resilience building of vulnerable communities

III. Key Thematic Areas:

The study was focused to find out the Livelihood condition of the rural communities, water availability, forest resources, food supply and security, interdepartmental coordination, applied research and mechanism of implementation of state-level policies and action plans, and effective approach towards the public education and awareness about the impacts of climate change and remedies for that.

IV. Methodology:

In order to achieve the required achievements of the project, 12 villages were selected in three districts (Muzaffarabad, Bagh & Haveli) of AJK. Four-way approach was undertaken to collect the data i) find out the community's perception through 12 community and individual meetings, ii) conduct 27 meetings with the key informants and officials of relevant departments responsible for dealing with the impacts of climate change iii) Universities of AJK for research perspective and iv) Media for sensitizing the public awareness. Different tools were developed and used for these surveys and analyzed to assess the degree of impact on the livelihood, water and other natural resources of the State and suggest the possible remedies for that.

Meeting with community at Haveli

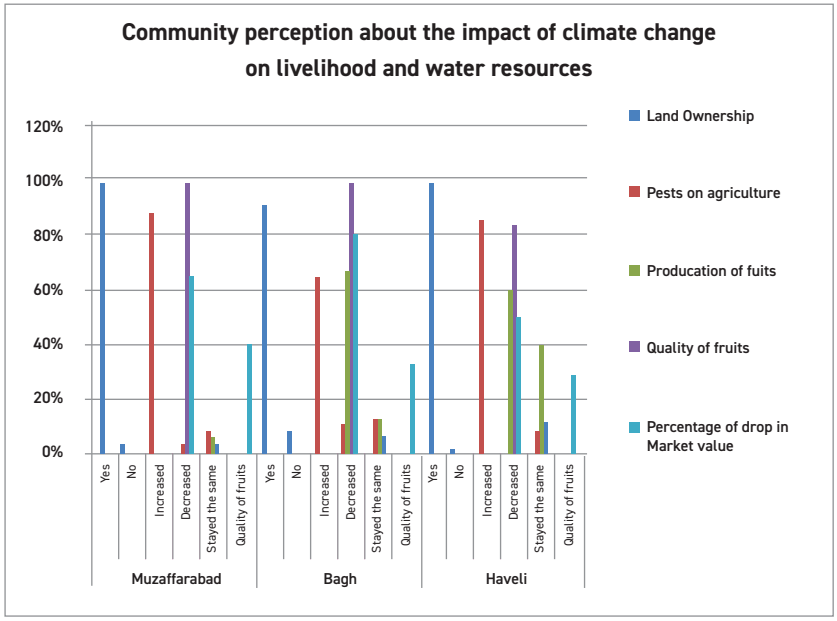
Meeting with media representatives at Muzaffarabad

Meeting with University officials

Meeting with the officials of Agriculture Department

V. Key Findings:

The study reveals that the representative communities of the selected districts have developed and maintained a strong perception related to climate change and its impacts on their livelihood sources. This is represented in a graph as follows:



As indicated in the graph, the representative community of the selected districts strongly believes that climate change is impacting their livelihood, water resources, agriculture, biodiversity, and causing seasonal changes, floods and causing serious problems for public health.

On the basis of the opinion of various different stakeholder groups, the study suggests the following remedial actions:

- **Adaptation:** While next to impossible to reverse the process and degree of climate change, adaptation to climate change emerges to be a more convenient option that includes the selection of alternate species, changes in crops in accordance with the changes in weather, elevation pattern etc.
- **Water Conservation:** The availability and quality of water being declining steadily, the society has no other option than to develop and use technologies for the enrichment of the aquifer, efficient water harvest, growing crops with lesser water requirement etc.
- **The Land Uses:** Pakistan in general and AJK in particular suffer mostly because of the lack of a proper land use policy that is implemented in its true spirit. The fertile lands are constantly being lost to other land uses that are dangerous for

the health of environment, triggering climate change and inviting its negative impacts on the entire society. This must be known to all which land shall be used for what, agriculture, forestry, housing, and others.

- **Education and Awareness:** Very few people at the moment are aware of the threats of climate change and their possible impacts on people's livelihoods and food security which is mainly because of the lack of any efforts on the part of the relevant organizations in both. Several NGOs exist in the state but no such mandate.
- **Climate Change Department:** Without a properly equipped and functional setup, nothing could be done to minimize the threats of climate change. A small cell can't be useful unless elevated to a department with needful resources, and mandate to cover all of the above and other emerging issues such as the management of animal and plant invasive species; introduction of and arranging to practice the intensive farming in agriculture, livestock, poultry and fisheries; establishing an early warning system as a safety measure against the disasters that have become so frequent and riskier.
- **Implementation of Climate Change policy, strategy and Action Plan:** In addition to all of the above, the proposed climate change Department must have to review the existing and approved climate change policy and make sure to implement it through all of the relevant departments, identified by the policy document. There is also a need for the utilization of the services of certain NGOs as focal cells for the training of the staff in designing climate change-based projects and their implementation in the field in addition to promoting coordination between the departments and NGOs working in the field of Climate Change.
- **Promotion of climate-based research:** There is a strong need for the development of coordination between the management departments and all of the AJK universities to promote management-based research on climate change

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