german cooperation
DEUTSCHE ZUSAMMENARBEIT

LASOONA
Relief and Development Organization

LOCAL ADAPTATION PLAN of Action for Village Council

CHAMTALAI AND MASHKOMAI TEHSIL KHWAZAKHELA

District Swat

Changing Minds for Climate Resilience through Awareness Raising and Local Capacity Measures

LOCAL ADAPTATION PLAN

of Action for Village Council

CHAMTALAI AND
MASHKOMAI TEHSIL KHWAZAKHELA

District Swat

This project “Changing Minds for Climate Resilience through Awareness Raising and Local Capacity Measures” is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Credits

Title of the study: Local Adaptation Plan of Action

Name of Project: Changing Minds for Climate Resilience through Awareness Raising and Local Capacity Measures project (CMCR)

First Edition: April 2024

Author: Khalid Iqbal Khattak (Lead Consultant)

Reviewed by: Noor Malik (Head of Programmes, LASOONA Relief and Development Organization, Anwar Ali, Project Manager CMCR)

Contributors:

Lead Contributor: Khadija Bano (Energy, Climate Change & Just Transition Cluster Technical Advisor Climate Adaptation and Coordination)

Contributor: Dr. Muhammad Abid (Energy, Climate Change & Just Transition Cluster Senior Advisor Adaptation to Climate Change)

Supported By: The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Publisher: LASOONA Relief and Development Organization

Table Contents

About The Plan

Context

According to the Global Climate Risk Index (CRI) 2021 developed by German Watch, Pakistan is ranked as the 8th most impacted country by the effects of climate change from 2000 to 2019. The index evaluates the influence of extreme weather events on both human fatalities and their economic consequences. It is noteworthy that Pakistan contributes only 0.43% of the world's total greenhouse gas emissions and is ranked 135th globally in terms of emissions. This information highlights the disproportionate impact of climate change on Pakistan despite its relatively low contribution to global emissions.

CRI 2000-2019 (1999-2018)	Country	CRI Score	Fatalities	Fatalities per 1000 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	7056.45	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

The 10 Countries Most Affected from 2000 to 2019 (Annual Averages)

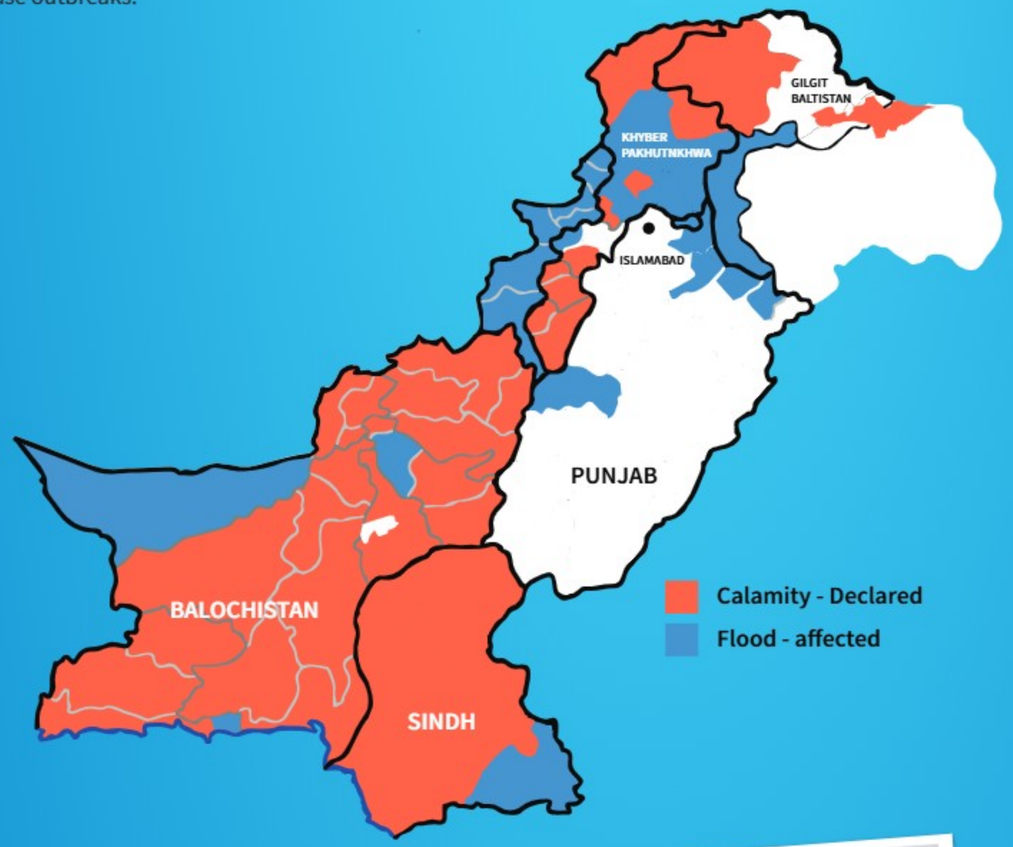
Climate change has adverse impacts on Pakistan as it continues to disrupt the water balance and the hydrological cycle, induces delayed supply chains, and results in reduced and poor food quality, among other adverse consequences. The agricultural sector is expected to be amongst the most adversely affected by climate change in Pakistan. The country is expected to experience increased variability of river flows due to increasingly erratic precipitation and the foreseen acceleration in the melting of glaciers. Hotter temperatures are likely to increase energy demand due to increased air conditioning requirements, when, on the other hand, water availability for hydropower generation may decline. Power generation may additionally be affected by increasingly warmer air and water temperatures which decrease the efficiency of nuclear and thermal power plant generation.

The 2022 floods in Pakistan brought widespread devastation, with the Government of Pakistan declaring 84 districts as ‘calamity hit’. Among these, the Swat district has faced significant challenges. This report narrows its focus to the implementation of LAPA in two VCs within Swat, reflecting on the specific local impacts and responses to the flood and climate change-induced disasters.

In Swat, the flood's impact was profound, mirroring the national trend of over 2 million affected houses and significant agricultural losses. In the two focal VCs, the floods severely disrupted daily life, with many houses damaged or destroyed. This destruction has exacerbated existing vulnerabilities, particularly for low-income groups, women, children, the elderly, and persons with disabilities.

The economic toll in Swat has been substantial. The disruption of agricultural activities, loss of livestock, and the destruction of stored food supplies have contributed to a sharp increase in food insecurity. The situation is aggravated by the year-on-year food price inflation, which is particularly acute in rural areas like Swat. Moreover, the damaged WASH facilities in these VCs have limited access to safe water, heightening the

risk of water- and vector-borne diseases. The longer-standing floodwaters pose an ongoing health risk, particularly in the more severely affected areas of Swat.
In response, the LAPA focuses on rebuilding more resilient communities in these two VCs. Key interventions include the restoration of infrastructure, improving food security through support to agriculture and livestock, enhancing WASH facilities, and bolstering healthcare services to manage and prevent disease outbreaks.



Pakistan Initiatives

Pakistan has made significant efforts and progress in combating climate change. The country has ratified important global conventions and protocols such as the UNFCCC (United Nations Framework Convention on Climate Change), the Kyoto Protocol, and the Paris Agreement. These international agreements demonstrate Pakistan's commitment to addressing climate change on a global scale. In addition to these global commitments, Pakistan has also taken domestic measures to tackle climate change. The National Disaster Management Act was promulgated throughout the country in 2010. This act aims to enhance disaster preparedness and response, including addressing the impacts of climate change-related disasters.

These efforts reflect Pakistan's recognition of the challenges posed by climate change and its commitment to taking action at both the national and international levels. By ratifying global agreements and implementing domestic legislation, Pakistan is working towards a more sustainable and resilient future. In July 2023, country first ever National Adaptation Plan was launched, to enhance the nation’s resilience against adverse impacts of climate change and environmental degradation. NAP is a framework for implementing large-scale environmental adaptation, building climate resilience, promoting inclusivity, and facilitating collaboration among different stakeholders, and serves as an effective tool for climate finance mobilisation.

Pakistan developed its first National Climate Change Policy (NCCP) in 2012 and in view of Pakistan’s high vulnerability to the adverse impacts of climate change, in particular extreme events, the major focus of the policy was on climate resilient development and adaptation. However, after Paris Climate Accord-2015, Pakistan accepted to contribute to the global emissions reduction efforts. Pakistan has updated its policy and the focus of the NCCP-2021 is equally on adaptation and mitigation it the major emphasis on nature-based solutions. In addition, Nationally Determined Contributions (NDCs) were updated 2021 which is inclusive and represents national consensus to accelerating the transition towards a climate-resilient economy. The updated NCCP-2021 now equally emphasizes adaptation and mitigation, with a major emphasis on nature-based solutions. This update reflects Pakistan's recognition of the need to address climate change through a comprehensive approach that includes both adaptation and mitigation strategies. Pakistan has also updated its Nationally Determined Contributions (NDCs) in 2021. The updated NDCs represent a national consensus and aim to accelerate the transition towards a climate-resilient economy. These contributions demonstrate Pakistan's commitment to taking action on climate change and aligning its efforts with global goals.

Moreover, the Ministry of Climate Change (MoCC) prepared a Technological Needs Assessment for Adaptation (TNA-Adaptation) to tackle recurring damage from extreme weather events, Pakistan’s TNA prioritizes climate monitoring, forecasting and early warning system technologies. To update and strengthen the current technical capacity of this type of technology, the TNA has outlined a project that aims to install two hundred automatic weather stations and five wind profilers, and automate fifty existing observatories .

Khyber Pakhtunkhwa Government Initiatives

Khyber Pakhtunkhwa's Response To Climate Change:
Khyber Pakhtunkhwa's Response to Climate Change: In line with the National Climate Change Policy (2021), Khyber Pakhtunkhwa was the first province to update its Provincial Climate Change Policy in 2022. This policy focuses on adaptation and mitigation strategies, highlighting the province's vulnerability to climate change impacts like locust invasions, dengue, and other viral diseases.
Climate Change Cell Establishment:
Climate Change Cell Establishment: A dedicated Climate Change Cell was established in the Planning and Development Department, a pioneering initiative in the region, to integrate climate considerations into development, planning, and budgeting. This initiative was supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
Climate Change Financing Framework (CCFF):
Introduced in 2018, the CCFF is a key component of Khyber Pakhtunkhwa's climate change response. It integrates climate change into public economic and financial management, aiding policymakers in making informed resource allocation decisions and aligning systems and policies for accessing international climate finance. The Climate Change Expenditure Tracking System is part of this framework.
LASOONA and GIZ Partnership:
In collaboration with GIZ Pakistan, LASOONA is implementing a 27-month project titled “Changing Minds for Climate Resilience through Awareness Raising and Local Capacity Measures”. This project, focusing on selected villages in District Swat and Dir of Khyber Pakhtunkhwa and District Rahim Yar Khan and Rajanpur of Punjab province, aims to increase the resilience of vulnerable communities, particularly women, people with disabilities, youth, and children. Detailed information on this project can be found here.
The creation of Local Adaptation Plans of Actions (LAPAs) was a crucial step in the project's efforts to cope the effects of climate change at the local level. These plans were developed through a rapid need assessment process conducted in 8 villages of the district and consultation with the relevant district officials . They involved evaluating the risks and vulnerabilities posed by climate change, identifying necessary adaptation measures, prioritizing actions, integrating the plans with existing development processes, and implementing, monitoring, and evaluating the plans. The ultimate goal of LAPAs was to strengthen community and ecosystem resilience, decrease vulnerability, and encourage sustainable development in the districts.

Purpose and Key Objectives

The creation of Local Adaptation Plans of Action (LAPA) for two village councils encompassing eight villages was a crucial step in the project's efforts to mitigate the effects of climate change at the local level. These plans, developed through a comprehensive and collaborative process, targeted the unique needs and vulnerabilities of these specific communities due to climate change. The process of developing LAPAs involved input from a wide range of stakeholders within the two targeted VCs that oversee eight villages. This included a detailed evaluation of the risks posed by climate change, identification of necessary adaptation measures, and prioritization of actions.
A key aspect of our methodology was the involvement of a multi-disciplinary team of experts in Climate Change/Disaster Risk Reduction, Agriculture, Water, Sanitation, and Hygiene. This team conducted an extensive climate change impact assessment across the eight village councils. Their approach included engaging directly with the communities through joint focused group discussions and key informant interviews with various community segments. Additionally, the team interacted with relevant district officials from the District Disaster Management Unit (DDMU), Department of Agriculture, Forest Department, Department of Health, and Public Health Engineering. These consultations, encompassing both primary and secondary data, were integral to ensuring that the LAPAs are well-informed and tailored to the specific needs of the communities.
The aim of these plans is not only to integrate them into existing development processes but also to ensure their effective implementation, monitoring, and evaluation. Ultimately, the LAPAs are designed to strengthen community and ecosystem resilience, reduce vulnerability, and foster sustainable development within these districts.
Vision:
Build a resilient Swat district where communities actively adapt to climate change. Our focus is on balancing socio-economic growth with environmental conservation, using community-driven, sustainable practices.

Goal:
Empower vulnerable communities in Swat to become resilient to environmental challenges. We'll achieve this through equitable resource management and gender-sensitive, inclusive strategies.

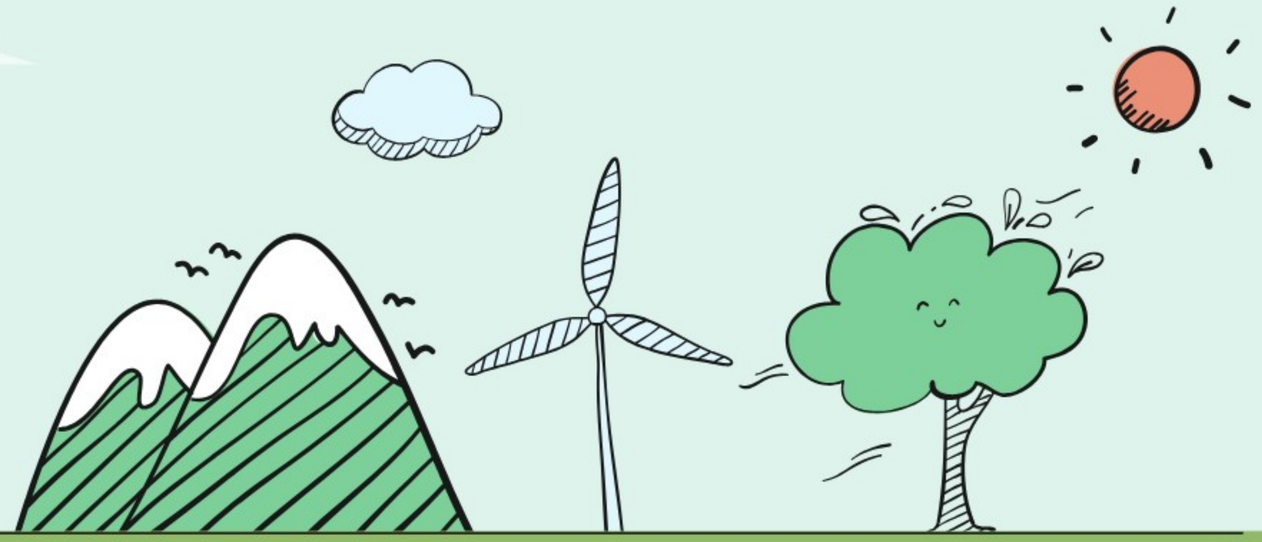
Objectives:

This local Adaptation Action aims to:
- Identify how climate change threatens local livelihoods, health, and ecosystems. Prioritize the most impacted sectors and communities.
- Develop practical measures such as improved infrastructure, land management, and disaster preparedness. Enhance community skills and awareness to tackle climate challenges.
- Ensure that our climate adaptation efforts align with existing local development plans. This will make our actions more effective and sustainable.
- Foster a network for exchanging regional and sectoral adaptation experiences. This encourages innovation and collective problem-solving.

This plan will support decision-makers in the most vulnerable communities of the district and their existing adaptation actions at local levels. They will prioritize adaptation actions and integrate indigenous adaptation actions to enhance climate resilience at the district/local level. This can also help in assessing the progress of other climate related projects to ensure effective service delivery and provide a thorough understanding of climate impacts on different social groups including gender and socially marginalized groups and to consider their needs ahead of climate-induced disasters.

Guiding Principles

The guiding principles of this plan are aligned with National Adaptation Plan (NAP), which are as under:
1. Integrate Climate Adaptation – Make it a core part of all decisions
2. Think Strategically – Plan for the changing climate across generations
3. Make Evidence-Based Decisions – Rely on scientic data and local knowledge
4. Promote Nature-Based Solutions – Prioritize nature protection for climate change
5. Act Locally – Understand and address local risks and opportunities
6. Leave No One Behind – Prioritize inclusivity and support vulnerable groups
7. Think Ahead and Stay Flexible– Proactively adapt to changing conditions
8. Address Inequity –Choose actions that promote social justice
9. Coordinate and Collaborate – Partner for effective adaptation efforts 10) Build Capacity & Knowledge – Enhance adaptation planning and understanding



Rationale For Development of Plan

Climate change effects, including the escalating temperatures, shifts in precipitation patterns, and heightened occurrence of extreme weather events, exert profound consequences on local communities, ecosystems, and economies. The development of this plan is specifically aimed at addressing the impacts of climate change at the local level, while concurrently integrating adaptation activities into community and district-level development planning processes. The overarching objective of this plan is to foster climate-resilient development by bolstering the resilience of communities, institutions, and ecosystems.
The aim of developing LAPA for village councils Mashkomai and Chamtalaiin District Swat is to integrate climate adaptation activities into local and national development planning processes and to create a situation for climate-resilient development. It aims to help the District Government in unifying the efforts of all partners working in various sectors across the districts, establish a clear direction, and provide a coordination platform for all the partners in bringing a paradigm shift in the district via response and recovery and adaptation and mitigation approaches. Responsiveness in LAPA will ensure immediate, efficient, and effective delivery of adaptation services to climate vulnerable communities and households; while flexibility in the implementation of LAPA will ensure immediate delivery of administrative, financial, and institutional services to implement adaptation actions effectively including but not limited to the following:

- Support activities from local to national level development planning.
- Identify the most climate-vulnerable communities and their adaptation challenges and opportunities, including possible activities.
- Identify and prioritise adaptation actions in easy ways whereby local communities make the prioritization decisions about their needs.
- Integrate LAPA into local plans.
- Identify and mobilize appropriate service delivery agents and necessary resources for the implementation of the LAPA.
- Adopt and/or implement adaptation actions sequentially by the service providers in a timely and resource-efficient manner.
- Conduct monitoring and evaluation by ensuring effective implementation of the plan of action.
- Identify cost-effective adaptation alternatives for scaling up into local and national planning.

(PSDP). Moreover, the strategies /interventions will be aligned with the IRC Strategy 100 - Strategic Action Plan, Sendai Framework for Disaster Risk Reduction (2015-30), Sustainable Development Goals (2015-30), and the 2015 Paris Agreement on Climate Change.

Additionally, the plan aims to engage and empower local communities, stakeholders, and relevant institutions in the adaptation process. This participatory approach fosters ownership, encourages collaboration, and harnesses local knowledge and expertise. By involving key actors, the plan ensures that adaptation initiatives are contextually relevant, culturally sensitive, and responsive to the specific needs and priorities of the local community. Furthermore, the plan recognizes the importance of learning and knowledge sharing. It seeks to document experiences, lessons learned, and best practices in climate change adaptation. This information exchange facilitates cross-learning between regions and communities facing similar challenges, thereby enhancing adaptive capacity, and promoting innovation in climate change resilience.

In summary, this plan is tailored to address the repercussions of climate change at the local level, by incorporating adaptation efforts into community and district-level development planning processes. Its primary objective is to promote climate-resilient development. Through the identification of vulnerabilities, the proposition of strategies and actions, and active stakeholder engagement, the plan seeks to strengthen the resilience of communities, institutions, and ecosystems. This resilience will empower them to withstand and recover from climate-induced challenges effectively, ensuring their long-term well-being and sustainability.

District Swat
at a Glance

General Profile of The District[1]

Swat Valley is located in the northern part of the Khyber Pakhtunkhwa province, with coordinates of approximately 35° North Latitude and 72° to 30° East Longitude. The valley is surrounded by towering mountains, creating a picturesque landscape. It shares borders with Chitral and Gilgit to the north, Dir to the west, District Mardan to the south, and is separated from Hazara by the Indus River to the east. The district headquarters of Swat is Saidu Sharif, although the main town in the district is Mingora. Saidu Sharif is situated about 131 kilometers northeast of Peshawar, the provincial capital. Covering a total area of 5337 square kilometers (sq. km), Swat District is divided into two tehsils: Matta, which spans an area of 683 sq. km, and Swat, which covers 4654 sq. km. The district boasts a significant forest cover, with a total of 497,969 acres of forest land. These forests are predominantly composed of various species of pine trees, adding to the natural beauty of the region.

District Headquarter	Saidu Sharif
Tehsils	Babuzai, Barikot, Kabal, Matta, Khwazakhela, Bahrain, Charbagh
Union Councils	Babuzai (17), Barikot (4), Kabal (12), Matta (13), Khwazakhela (7), Bahrain (8), Charbagh (4)
Village Councils	Babuzai (49), Barikot (17), Kabal (39), Matta (46), Khwazakhela (30), Bahrain (22), Charbagh (11)
Area	5337 Sq Km
Climate	The winter season is long and extends from November to March, rain and snowfall occurs during this season. The hottest month is June with mean maximum and minimum temperature of 33°C and 16°C respectively.
Average Maximum Temperature	Based on weather reports collected during 2005-2015. Hottest Month - July (28 °C average) Coldest Month - January (8 °C average) Wettest Month- August (100.5 mm average) Windiest Month - May (2 km/h average) Annual Precipitation - 730.3 mm per year
Demography	
Population	2,309,570
Population Density	421 persons per Sq Km
Growth Rate	4 % (One of the highest in Pakistan)
Rural Population	88%
Male Population	51.53%
Female Population	49%
Sex Ratio (males per 100 females)	101%
Children (0-5 years)	17%
Active Population (15-64 years)	53%
Dependency Ratio	88%
Household Size	8
Livelihood Sources	
Total Cropped Area	180,586 Hectares
Total Irrigated Area	84,918 Hectares
Major Crops	Maize, Wheat, Fruits, Vegetables, Rice

[1] District Disaster Management Unit Swat: District Swat Disaster Response Plan

Climate Profile of SWAT

Climate in Swat is a function of altitude, with mountains in the Kohistan region snow-clad year round. The upper areas of the region are relatively colder and often get snowfall in the winter. Drier, warmer temperatures in the lower portions in the Yousafzai Plains where summer temperatures can reach 105 °F (41 °C), although the lower plains experience occasional snow. Both regions are subject to two monsoon seasons - one in winter and the other in summer. Swat's lower reaches have vegetation characterized by dry bush and deciduous trees, while the upper areas mostly have thick pine forests .

Swat lies in the Hindukush Himalaya region where the impacts of climate change such as retreating glaciers, changing hydrological processes, extreme floods and snow cover changes are most prominent (Qing-Long et al., 2017). The Swat district is acutely vulnerable to the consequences of a shifting climate and stands as the sixth most at risk district in Pakistan regarding exposure to climate change-related hazards. Swat district has high ratings of 5 for Flood and Landslide Risk, along with a significant rating of 4 for Drought Risk, indicate an elevated vulnerability to climate change impacts, particularly in terms of increased flooding, landslides, and prolonged droughts. Additionally, the notable rating of 5 for Avalanche and GLOF Risk underscores the heightened susceptibility to glacial lake outburst floods and avalanches, further emphasizing the region's vulnerability to climate-induced hazards .

Subtropical Zone:
This zone comprises of the areas with 600 to 1000m in lower to upper Swat. It come under monsoon range having mild winter with very little or no snowfall in winter.

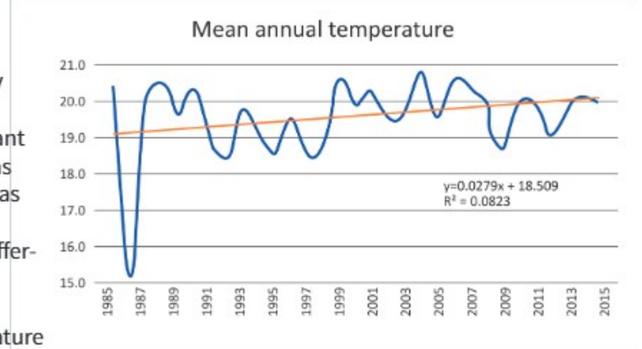
Humid Temperature Zone:
This zone receives heavy monsoon rainfalls and comparatively little snowfall, and extends up to an altitude of 1500 m.

Sub-Humid Temperate Zone:
This zone covers high mountainous areas, at the altitude between 1500 and 3200 meters.

Subalpine Pastures:
This zone covers the high-altitude plains which retain snow for five to six months annually. The agro-ecology of this areas can be seen at altitude of 2300-3600 m.

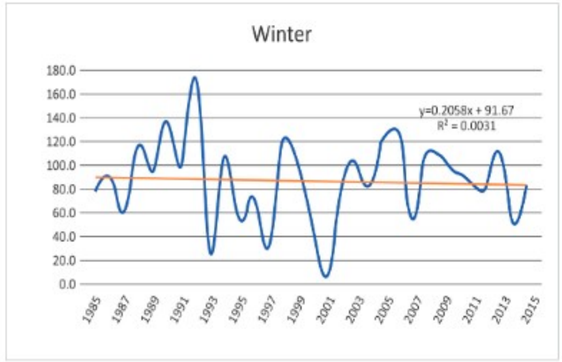
Alphine Zone:
This zone is among the highest agro-ecological regions of River Swat catchment, at the altitude of 3600 to 4600 m. This zone is mostly exploited for grazing livestock and collection of medicinal plants.

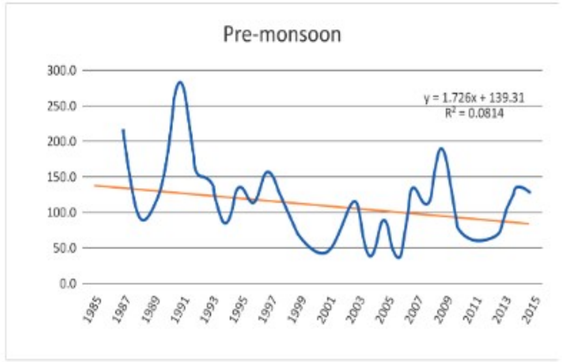
Cold Desert Zone:
This zone is represented by the highest mountain peaks above the vegetation line, at the altitude of 4700-6261m. Glaciers, ice fields and permafrost are main characteristics of this zone, and is responsible for continued flow of Swat River.

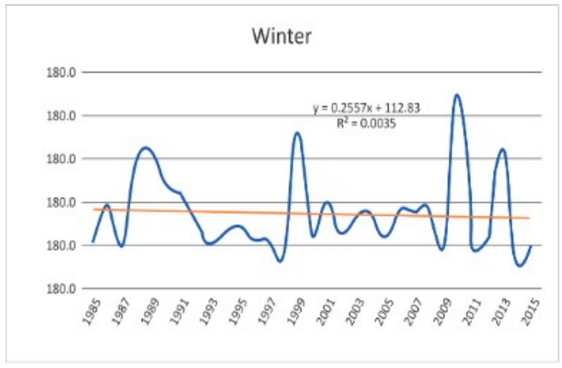


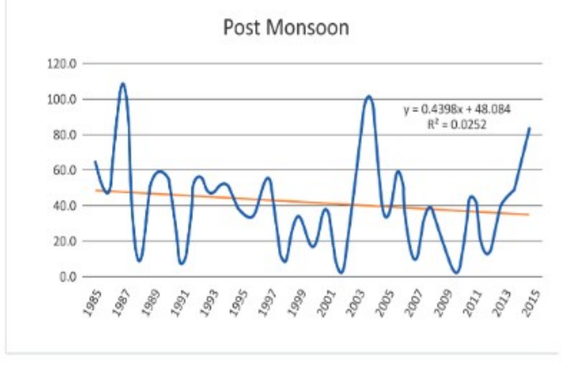
Temperature:
During the Focus Group Discussions (FGDs) and Key Informant Interviews conducted in the assessment phase, participants consistently reported a significant rise in temperature in the area. This observation was further supported by scientific secondary data. It was found that the annual average temperature in the district is closely associated with the altitudes of different zones within the district, as discussed earlier.
The trend analysis of 31-years temperature data (1985-2015) revealed an overall increase in temperature of the area. The linear trend line for the mean annual maximum temperature indicated an increasing trend of 0.0319 °C per year (y = 0.0319x + 25.433, R 2 = 0.05) while the mean annual minimum temperature showed an increasing trend of 0.0239 °C per year (y = 0.0239x + 11.576, R2 = 0.0541). likewise, the mean annual mean temperature showed an increase of .0279°C per year (y = 0.0279x + 18.509, R^2 = 0.0823) for 31-years period. The lowest and highest mean annual temperature were recorded in 1986 and 2004 as 15.32 °C and 20.02 °C respectively .

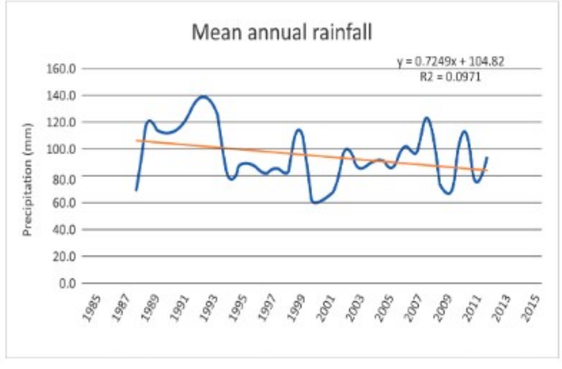
Rain
he statistical analysis of 31 years' rainfall data (1985-2015) revealed a noticeable variation in the precipitation pattern. The linear trend line for the mean annual precipitation indicated a decreasing trend of -0.7249 mm per year (y = -0.7249x + 104.82, R2 = .0971) while winter (y = -0.2058x + 91.67, R^2 = 0.0031), pre-monsoon (y = -1.726x + 139.31, R^2 = 0.0814), monsoon (y = -0.2557x + 112.83, R^2 = 0.0035) and post-monsoon (y = -0.4398x + 48.084, R^2 = 0.0252) all showed a gradual decrease in mean precipitation. The highest decrease was noted in the post monsoon period with the trend line showing a decrease of -1.726 mm/year for the 31 years' data.











trend of -0.7249 mm per year (y = -0.7249x + 104.82, R2 = .0971) while winter (y = -0.2058x + 91.67, R^2 = 0.0031), pre-monsoon (y = -1.726x + 139.31, R^2 = 0.0814), monsoon (y = -0.2557x + 112.83, R^2 = 0.0035) and post-monsoon (y = -0.4398x + 48.084, R^2 = 0.0252) all showed a gradual decrease in mean precipitation. The highest decrease was noted in the post monsoon period with the trend line showing a decrease of -1.726 mm/year for the 31 years' data. The 31-years rainfall data shows that maximum precipitation event was recorded as 136.7 mm in 1991 (wettest year or with more rainfall) while the minimum precipitation was recorded as 60.9 mm (drought prone or driest year) in 2000. The highest monsoon precipitation (226.5) occurred in 2010 which resulted in massive flooding event in the Valley .

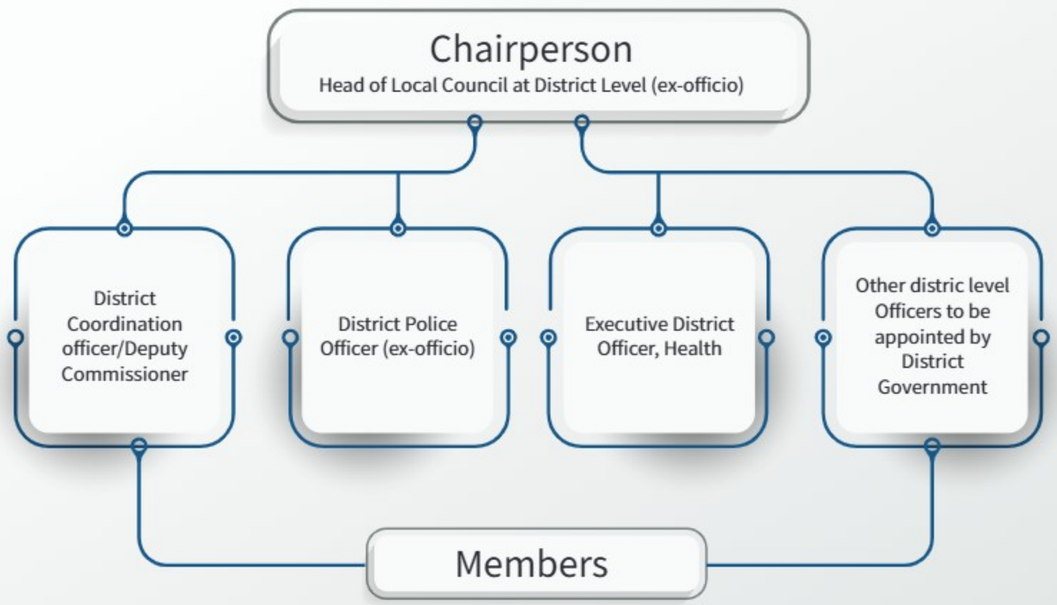
Governance & Administration

Like other Districts the Deputy Commissioner supervises the activities of all the departments at district level. Whereas at sub-divisional level, the Assistant Commissioner,& Addl: Assistant Commissioner are responsible for the smooth running of the activities of all government departments in the sub-divisional level. The major concern is the maintenance of law and order and development in the district as District Magistrate/ Administrator. Deputy Commissioner is the District Collector and in charge of district record room and treasury.

District Disaster Management Authority

Constitution & Structure of DDMA

Section 18, Chapter IV of NDM Act 2010, envisaged constitution of DDMA (KP Province named them as DDMUs) for every district by the province. AS per the Act, the district authority shall consist of such number of members, as may be prescribed by the Provincial Government. The Act has proposed the following organizational structure for all district level DMAs.



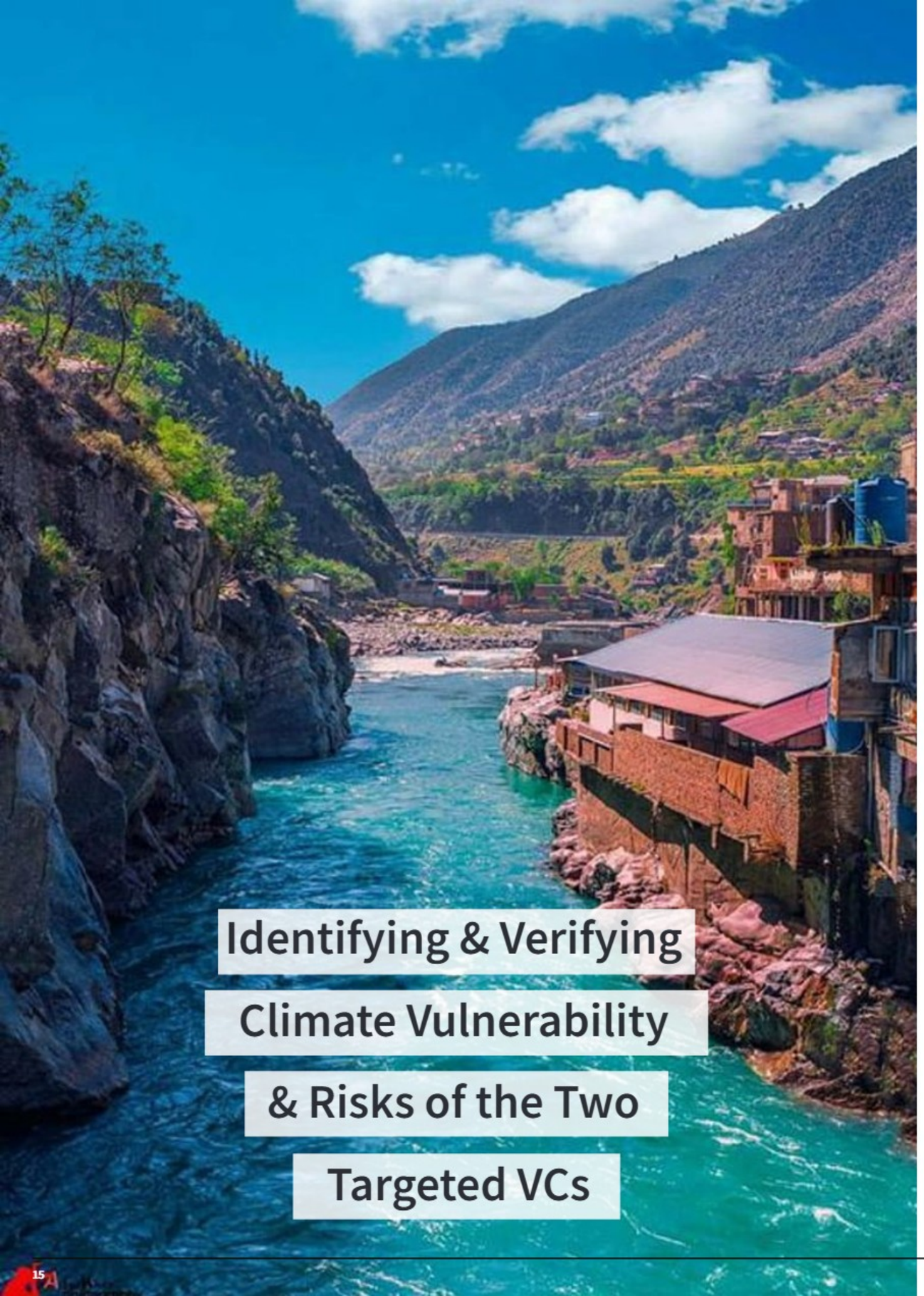
The Chairperson of the district authority have power to exercise all or any of the powers of the authority in case of emergency. However, the exercise of such powers shall be subject to ex-post facto approval of the District Authority.

LAPA Development Methodology

A multi-disciplinary team expert comprised of Climate change/ Disaster Risk Reduction, Agriculture and water, sanitation and Hygiene conducted climate change impact assessment in village councils Mashkomai and Chamtalai of the district. The team met with the communities and conducted joint focused group discussions and key informant interviews with different segments of the community groups. In addition, the team also conducted key informant interviews with the relevant district officials from District Disaster Management Unit (DDMU), Department of Agriculture, forest Department, Department of Health, and Public Health Engineering.
The team also reviewed the secondary data for development of this adaptation plan which includes:

- National Climate Change Policy (NCCAP) 2021
- National Adaptation Plan (NAP) 2023
- Climate change Policy of Khyber Pakhtunkhwa 2022
- District Profile of Swat
- District Disaster Response Plan Swat
- Local Adaptation Plan of Action, District Chaman
- Local Adaptation Plan of Action, District Chaman

The Plan Development Process



Identifying & Verifying Climate Vulnerability & Risks of the Two Targeted VCs

Climate Risk Profile of the District

The Swat district is situated in the Hindukush Himalaya region, which is highly susceptible to the impacts of climate change. In this region, various climate change phenomena are particularly noticeable, including retreating glaciers, alterations in hydrological processes, increased occurrences of extreme floods, and changes in snow cover. One of the significant impacts of climate change in the Hindukush Himalaya region is the retreat of glaciers. As temperatures rise, glaciers are melting at an accelerated rate, leading to a reduction in their size and volume. This has implications for water availability downstream, as glaciers serve as natural water reservoirs.

Swat River:

The Swat River in the Swat district serves as the primary drainage basin. It originates in the upper part of the district as rushing streams from glacial lakes and permanent ice caps. The river flow is influenced by snow melt and monsoon rainfall, with snow melt occurring from March to June and monsoon rainfall from July to August. Climate change affected the timing and amount of snowmelt and rainfall, which directly influence the water flow in the Swat River. The flooding of 2010 and 2020 in River Swat brought destruction to a large area of district Swat costing human lives and badly affecting agricultural lands, tourism spots, transportation and public property. Alterations in these patterns lead to fluctuations in water availability, affecting agriculture, hydropower generation, and overall water resources in the region. The combination of intense rainfall events and changes in hydrological processes results in an increased risk of extreme floods in the Swat River basin. These floods caused significant damage to infrastructure, livelihoods, and the environment, posing a threat to the communities living along the river. The fluctuations in river flow have also adverse impacts of social erosion. Changes in water temperature, flow patterns, and water quality due to climate change can have adverse effects on the freshwater species that inhabit the Swat River. This can disrupt the river's ecological balance and potentially lead to the loss of certain species. Due to multitude of problems including pollution, unplanned urbanization, deforestation, illegal fishing, encroachments, the River is facing serious threats to its riverine ecosystem and water quality (PDMA, 2015).

Furthermore, climate change has brought about changes in hydrological processes. The patterns of rainfall and snowfall have become more erratic, resulting in altered water flow patterns and increased variability in river discharge. These changes pose challenges for water resource management and have impact agriculture, hydropower generation, and overall water availability. The region has also witnessed a rise in the frequency and intensity of extreme floods. Climate change has contributed to more intense rainfall events, which can overwhelm rivers and drainage systems, leading to devastating floods. These floods not only cause immediate damage to infrastructure and livelihoods but also have long-term consequences for the affected communities.

Area of Climate variability	change		
	Increased	Decreased	No change
Rainfall		x	
Snowfall		X	
Temperature	X		
Floods	X		
Droughts	X		
Summer Duration	X		
Winter Duration		X	
Early Springs		X	
Water in springs		X	

Climate Induced Vulnerabilities

Climate Induced Disasters

a. Floods. Rainfall in the district generally occurs during two different seasons: winters rainfall continues during December to March while summers rainfall which falls during June to September. Normally monsoon arrives in first or second week of June but major floods occur in late summer i.e. July to September. During recent years, it has been commonly observed that the distribution of rainfall is disturbed due to climatic changes and the district receives heavy rainfall in the form of erratic and cloud burst normally occurs especially during the monsoon season. These types of rainfall generate flash floods and witnesses of loss of life and property in District Swat. During July 2010 the Swat valley was badly affected by the devastating floods that caused enormous losses to human life, collapse of social infrastructure, tourism, and agriculture. Standing crops were washed away, while new crops couldn't be grown up due to sediment deposits in the field, tourism industry badly affected as most of the hotels and restaurants washed away, while all the trade activities came to a standstill. Thus, the local economy was badly shattered while food insecurity in the region was threatened seriously. The unprecedented rainfall led to the creation of secondary disaster such as landslides, mudslides, riverine floods, and flash flood in the upper reaches of river Swat and its tributaries. Due to mountainous terrain as river flows in narrow "V" shape valleys the flood affected area is less but, on another hand, due to heavy speed of the flood water causes heavy damages to properties and infrastructure.
b. Hailstorm. Swat produces large number of fruits and vegetables because of the favourable climatic conditions. It produces both seasonal and off-season fruits and vegetables. It accounts 45% of fruits and 1/3rd of province-wide vegetable yield. 3/4th of the total onion production in the province is contributed by Swat. July is the peak season for various fruits and vegetables in Swat. Hailstorm also follow similar time pattern and badly affect quantity and quality of fruits and vegetable in almost all parts of the district though consider medium in terms of physical and livelihood loss. Nominal disaster of jointly hailstorm and windstorm occurred back in 2007 in Mingora city which resulted into death of 07 people, mainly because of tree falling, roof falling and traffic accidents. Hailstorm accompanied with thunderstorm and heavy rains are common in the months of June, July and August. Its effect is severe on fruits in comparison to noticeable impacts on vegetables. In some cases, dry wheat crops and vegetables in thousands of acres of land have considerably suffered during the hail storms. The intensity of hailstorms is mostly so severe that it knocked down fruits from the trees. The strong winds uprooted many trees and flattened wheat crop.
c. Glacial Lake Outburst Floods (GLOF). Global climate change has influenced the snow and glaciated environment of the Hindukush-Karakoram-Himalaya (HKH) region of Pakistan, which contributes more than 50% of the total flow of the Indus River system. As a result of this situation the frequency of glacial hazards has increased in this part of the Himalayan region. Sudden breach of the unstable moraine 'dams' results in discharges of huge amounts of water and debris – known as glacial lake outburst floods (GLOFs) – that often have catastrophic effects downstream. Swat is also prone to GLOF. The Provincial Disaster Management Authority (PDMA) on June 22, 2023 issued an alert of flash floods in Upper Chitral, Lower Chitral, Kohistan, Upper Dir, Lower Dir and Swat due to possible glacial lake outburst flood (GLOF).
d. Snowfall. During winters the district received snowfall in most parts. The North, North-East and West received a tremendous amount of snow accumulation. It usually occurs in the winter season mainly affecting the Kalam, Utror, Balakot, Mankiyal, Behrain and Beshigram Ucs. These UCs are not only affected by heavy snowfall but the increasing deforestation and environmental degradation activities provide the ideal gullies for snow avalanches which is an increasing threat to the down gullies inhabitants. In the recent years the frequent glacial avalanches phenomenon in the said union councils reportedly claimed lives, livestock losses and nfrastructure damages. In case of heavy snowfall, also the burden on families' increases for protecting their houses and removing excessive snow from the roof tops. The food and feed stocks that may be sufficient till the end of February/ March could result into scarcity if not properly managed.
e. Landslides. The mountain and hillsides areas around the district are particularly vulnerable to landslide hazards. Aside from the young geology and fragile soil type of mountain ranges especially in the upper reaches of the district, accelerated deforestation ad degradation of the natural slopes are major causes behind increase incidents of landslides. Small isolated landslides occur frequently in the areas with no tremendous impact on the built system while the slides generated by floods, earthquakes and heavy snow burden (glacial avalanches) brings consequences to the lives, property and critical facilities. In the district the noticeable landslides occur in the months of March and April due to continues rainfall and snow melts which soften rocks and earth surface especially in the mountainous areas.

Several link roads become temporary blocked and causing mobility issues for the inhabitants of the out reaches. The consequences bring upon are houses, buildings and infrastructure collapse, road pavement cracks, depression made and mass wasting problems. The vulnerability of the local populates multiply with the settlements in the landslides prone areas due to population expansion, lack of awareness, poverty and lack of resources.

Water and Sanitation

The assessment on the impact of climate change on WASH in the Swat District highlights several key issues. The primary challenge is the scarcity and contamination of water sources. In Swat, tap water is the most common source, followed by dug wells, motor pumps, hand pumps, and other sources like springs, ponds, and rivers. Notably, 1.25 million people rely on surface and groundwater, which are often contaminated with fecal coliform bacteria, leading to waterborne diseases like gastroenteritis, dysentery, and diarrhea. Regarding sanitation, while 90 percent of the population uses flush toilets, a significant portion still practices open defecation. Most flush toilets are connected to pits or septic tanks, with few linked to sewerage systems. Solid waste management is another concern, with a large portion of waste dumped in open spaces, and only a small fraction systematically collected by the municipality.
Climate change exacerbates these issues, as revealed in interviews, and focus group discussions. Communities report declining water supplies, with monsoon rains contaminating drinking water sources and droughts depleting groundwater levels. These conditions increase the prevalence of waterborne diseases, as confirmed by district health officials. Additionally, inadequate sanitation facilities compound the risk of disease, highlighting the need for improved WASH services in Swat to combat the health impacts of climate change.

Health

The assessment conducted in the two targeted VCs of Swat District has brought to light the significant effects of climate change on local community health. Through interviews with local communities and health professionals, a range of health-related issues linked to climate alterations was identified.

Key among these concerns is the change in weather patterns. The area now experiences shortened winters, unexpected and heavy rainfall, along with more frequent and severe flooding. These weather shifts have significantly impacted the health and lifestyle of the communities. The infrastructure damage caused by excessive rainfall and floods has led to transportation issues and the isolation of communities. This affects children's education and healthcare access. Inadequate water drainage and unpaved roads create muddy conditions, complicating travel and limiting access to vital services. Health-wise, there is an increase in waterborne diseases like dysentery, cholera, and diarrhea. Skin conditions such as scabies and rashes, especially among children, are more common, as are malaria and typhoid. Children are particularly susceptible to these illnesses.

Water scarcity and contamination pose another grave challenge. Irregular rainfall reduces water availability, forcing reliance on potentially contaminated sources like ponds or streams, heightening the risk of waterborne diseases. The warmer temperatures and varied precipitation have also escalated vector-borne diseases. Conditions are now more conducive to the spread of disease-carrying vectors like mosquitoes and ticks, leading to increased cases of malaria and dengue fever. Furthermore, the impact of climate change on agriculture has led to food insecurity and malnutrition. Unpredictable rain, droughts, and extreme weather have caused crop failures and lower yields, affecting food availability and affordability. This particularly affects children and pregnant women, increasing the risk of health issues like stunted growth and weakened immunity.

District health officials also noted a rise in heat-related illnesses, including heatstroke and dehydration, due to higher temperatures. Heat waves are more frequent and intense, posing a risk to the elderly, children, and those with existing health conditions. There is also a noted increase in respiratory issues within the community.
In conclusion, the study in Swat District reveals that climate change has deeply affected community health. The impacts include altered weather patterns, water issues, rising waterborne and vector-borne diseases, agricultural problems, increased heat-related illnesses, and respiratory problems.

Agriculture

Swat District of KP covers an area of 5337 Sq Km and has a population of 1.26 million. The area lies in the temperate zone, where various factors including altitude, latitude, Indian Ocean monsoons, and western cyclonic currents control the climate. June is the hottest month and January is the coldest month in the area. The average rainfall in the study area ranges from 1000 to 1200 mm annually. Most of the population is dependent on natural resources including agriculture, livestock, fisheries, tourism, and forest resources. The agriculture sector represents the major livelihood source, employing around 42% of the population in the area . Of the total cultivated land of 1.88 million hectares in KP during 2019 -2020, District Swat is covering 97,077 hectares which is 5% of the total cultivated land of the province. Swat having suitable climate for horticulture crops and is the leading district in vegetables and fruits both area and production wise.

The assessment study was focused on two Village Councils; Mashkomai and Chamtalai in Tehsil Khwazakhela of district Swat and following are the details of current status of agriculture in these two Village Councils:

Sources of Irrigation & Techniques

- In Village Councils (VC) Mashkomai and Chamtalai, the main source of irrigation is the snow melting water in mountains which is diverted through channels/pipe to irrigate the fields. The channels are mostly unlined and damaged. The fields are irrigated through water courses which are lined, unlined and some are damaged.
- Spring and streams are another source of irrigation. The people living in upland part of the areas are using this source through pipe and grow vegetables and pulses etc
- Tube wells for irrigation are not on large scale. There are some farmers have their tube wells run through diesel, and electricity. Tube wells running through fuel are very costly.
- Flood irrigation is common in Swat and Lower Dir. There is no water storage facility
- Water table in tube wells are going down

Main Crops

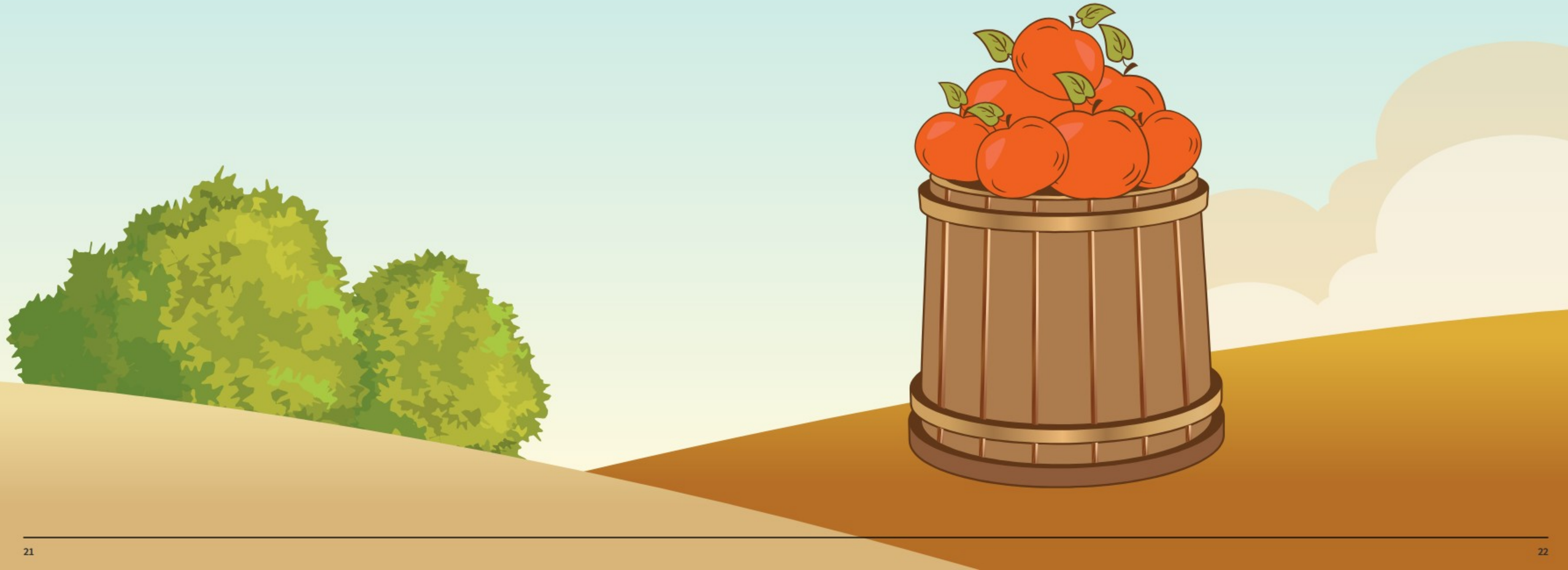
- Wheat, Rice and Maize are main crops cultivated in the area. Rice is grown on irrigated land while wheat and maize on rainfed land. Broadcast method is used for seed sowing of wheat and maize.
- Crop season for Rice (Jun to Nov), Maize (Jul to Oct) and Wheat (Nov to May/Jun)
- Cropping pattern (irrigated land): Rice – Wheat/fodder/Onion – Rice
- Cropping pattern (rainfed land): Wheat – Maize/ Vegetables - Wheat
- Maize and vegetables are intercropped with orchards of peach etc
- Wheat produced fulfil demand of household for 3 to 4 months and for the rest of period in the year, flour is purchased from market
- Growers who are growing maize and rice are self-sufficient and don't purchase from market for their consumption.

Vegetables

- Winter vegetables grown in proper Chamtalai and Mashkomai are; Peas, Onion, Radish, Turnip.
- Summer season, commercial vegetables grown are; Okra, Tomato, Potato
- Potato and peas are grown in the upper areas on rainfed land dependent on rain while other vegetables are irrigated from tube wells. Summer potato is common in this area.
- No commercial vegetables are grown in Dandu village of VC Chamtalai
- Peas is the cash crop and is off season for down country market.
- Onion is grown on irrigated land while potato and tomato on unirrigated land dependent on rain while other vegetables are irrigated from tube wells.
- Main market for Mashkomai and Chamtalai growers is Khwazakhela and Mingora markets.
- Vegetables are intercropped with orchards in both VCs
- Vegetables cannot thrive in irrigated rice fields because the excess water can drown the plants and cause root rot. Fruit trees and vegetables need well-drained soil to survive.

Fruit Orchards

- In VCs Mashkomai and Chamtalai the main fruits are; Peach, Plum and Persimmon
- Peach is the leading fruit covering more than 80% of fruit area in both areas
- Orchards are established on rainfed land and irrigated through diesel generator tube wells or dependent on rain
- 80% farmers sell their fruit through contractors at flowering stage
- All farmers practice regular pruning of trees
- There are commercial fruit nurseries in Khwazakhela and Mingora near to project areas
- Fruit orchards cannot thrive in irrigated fields because the excess water can drown the plants and cause root rot. Fruit trees need well-drained soil to survive.



Inputs (Nursery Plants, Seed, Fertilizer and Pesticides)

- 50% farmers recycle wheat seed for the next season. Uncertified wheat seed without seed treatment is used
- Maize and Rice seed is almost 100% purchased from market. Rice China variety is commonly used
- 100% farmers buy vegetable seed from market. About 50% farmers recycle onion seed for the next season. Those farmers who miss the onion sowing season, buy seedlings from neighbor farmers
- Weedicides is used in wheat crop for weeds (unwanted plants) control
- Excessive use of pesticides against viral and fungal diseases in vegetables
- Farmers buy fruit plants from local nurseries.
- Expertise in pruning and spray is available locally
- Farm Yard Manure and synthetic fertilizer is used
- No mechanization except tractor with thresher is used for cereal crops

Women role in Agriculture in Swat

Traditions, culture and customs are same in Swat and Lower Dir. Women keeping in view their culture are supporting their men family members in farming like seed threshing, storing seeds, picking vegetables and cooking food for labors engaged in the field. Most of the women are growing vegetables near their house for kitchen purpose. They enjoy to cultivate, maintain their gardens and collect fresh vegetables. As part of culture, women share vegetables with other neighbor women. Male buy seed and fertilizer from market and women sow according to the season. During study women asked for quality seed and new improved cultivation practices. Poor quality of vegetable seed, incidence of diseases and low yield of vegetables and scarcity of water are common challenges. Their interaction with technical service providers is prohibited due to local traditions and don't know about climate smart agriculture technologies.

Institutional Analysis in dealing with Climate Change Challenges

Sectors	Available Sector Policy	Climate Change related Projects in district	Implementation Gaps
Environment /Climate Change	National Climate Change Policy 2021 National Adaptation Plan 2023 Khyber Pakhtunkhwa Climate change policy 2022 Khyber Pakhtunkhwa Climate Change Action Plan 2022	Glacial Lake Outburst Flood GLOF - II, implemented by UNDP and Ministry of Climate Change in districts of GB and KP (including Swat Climate Resilience Horticulture interventions in KP funded by NDMRF in 7 divisions of KP-	- Limited capacity of district stakeholders in climate change adaptation strategies
Health	Khyber Pakhtunkhwa Health Policy (2018-2025) The Khyber Pakhtunkhwa Epidemic Control and Emergency Relief Act, 2020 The Khyber Pakhtunkhwa Health Foundation Act, 2016	Extension of D-TALK & Insulin for Life Program This Early Needs Identification (ENI) Khyber Pakhtunkhwa Health Systems Strengthening Program – ADB	Fast Demographic Growth1 Poor Access to and Utlization of Health Services[2] Underfunded Public Health System3 Lack of Comprehensive Legislation[4] Transportation Support[5]
Water and Sanitation	The Khyber Pakhtunkhwa Water Act, 2020	Leveraging Inclusive WASH For Empowerment in Pakistan Environmental Protection Society Leveraging Inclusive and Climate-Sensitive WASH for Empowerment Water for Women	Lack of Access to WASH Services6 Quality and Safety of WASH Infrastructure7 Operation & Maintenance[8]
Agriculture and irrigation	Khyber Pakhtunkhwa Agriculture Policy 2015-25 Khyber Pakhtunkhwa Farm Services Center Act 2014	Climate Resilience through Horticulture interventions in Khyber Pakhtunkhwa sponsored by National Disaster Risk	Limited Capacity of staff of Agriculture department in climate resilience

Prioritization of Adaptation Options

Solutions and its Prioritization

Action Planning is a vital component of Local Adaptation Plans of Action (LAPA) as it involves developing strategies for implementing interventions. It includes the identification and prioritization of adaptation options, taking into account climate threats. This prioritization process aids decision-makers in selecting actions that are both cost-effective and sustainable, with a focus on meeting the needs of vulnerable communities. Following consultations with the government, civil society, and communities, the following adaptation measures have been prioritized based on technical considerations. These measures have been categorized as immediate, medium-term, and long-term solutions, with the specific timeline for implementation determined by the researcher's assessment.

Climate Change and Disaster Risk

Climate Risk Assessment (CRA)

The detailed climate risk assessment of district Swat is recommended to be conducted for the district to identify climate induced vulnerabilities on different sectors, segments of society for development of more targeted strategies to mitigate and adapt to climate change. Community participation in CRA process. In addition, the climate risk assessment will provide scientific evidence and data that will inform decision-making processes. It will also help local authorities, policymakers, and stakeholders in Swat to understand the potential risks associated with climate change and make informed decisions about land use planning, infrastructure development, disaster management, and resource allocation.

Community Sensitization and Awareness

Conduct multi strategic awareness to sensitize community about climate change risks and its adverse impacts of climate change and to improve climate change adaptation actions of the community. These actions may include information dissemination through awareness sessions, information education and communication material, behavior change communication messages etc. appropriate communication channels should be used for awareness sessions.

Information Dissemination: Share accurate and up-to-date information about climate change risks and adaptation strategies through various channels such as websites, social media, brochures, and local media outlets. Ensure that the information is accessible and easily understandable for the community.

Capacity Building

Local Action Plans: Develop and implement local action plans that address specific climate change risks and adaptation needs of the community. These plans should involve community input and focus on practical actions that can be taken at the local level. It is recommended to conduct capacity development sessions for community and government officials.

Community Engagement

Engage with the community through various platforms such as town hall meetings, community forums, and online platforms to discuss climate change risks and adaptation strategies. Encourage community participation and involvement in decision-making processes. Use existing community structures like CBOs, village organization, village disaster management committees' structures for development and implementation of community level adaptation plans.

Development of Community Adaptation Plans

The community should be mobilized to develop their community-based adaptation plan of actions (CBAPAs) in collaboration of district officials. A comprehensive advocacy plan should also be developed to incorporate community level prioritized action in village councils, tehsil and district annual development plans.

Stakeholders' Capacity Building

During the field assessment it was found that there was lack of knowledge among communities and staff of the government line departments about basic knowledge about climate change adaptation strategies

Improved Stakeholders' Coordination

Work closely with government agencies responsible for climate change policies and initiatives. Advocate for policies that support climate change adaptation and encourage the integration of community perspectives in decision-making processes.

Agriculture and Irrigation

Solarization of Tube Wells

In Swat farmers are using diesel or petrol generators to power their tube wells. The generator is connected to a water pump, which draws water from a well or borehole. The water is then distributed to the crops through a network of canals or pipes. This system has a number of drawbacks. First, the cost of fuel can be high, especially in remote areas where fuel prices are higher. Second, the power supply from the generator can be unreliable, especially during peak demand hours or during power outages. Third, the generator produces emissions that can pollute the air and contribute to climate change. Fourth, the generator can also produce noise pollution that can be disruptive to people and animals in the area. During field assessment the farmers shared their challenges of high cost of diesel/-petrol use for the power of their tube wells and requested for support in conversion of existing system of running tube wells with diesel/petrol generators to Solar tube well system.

Water Harvesting Through Water Tank Technology

Spring and stream water is a major source of irrigation in the project areas. The region is home to many springs, which are fed by the melting snow and glaciers of the Hindu Kush mountains. The spring water is typically clean and cold, making it ideal for irrigation. Farmers are using this source through open unlined water channels for irrigation of variety of crops including vegetables and fruits. These channels are prune to damage during extreme weather events, such as heavy rains or floods. During heavy rains, the channels can overflow, causing waterlogging and damage to crops. During dry periods, the channels can dry up, leaving farmers without water for their crops. To address this problem, farmers need to use water tanks with pipes. Water tanks can store water during wet periods and release it during dry periods. The pipes can be used to transport water to the crops, even if the channels are damaged.

Vertical Farming for Vegetable Production

Climate change is having a significant impact on vegetable cultivation in target areas. The average temperature is rising, and the rainfall is becoming more erratic thus increasing the risk of pests and diseases. These pests and diseases can damage crops and reduce yields. The conventional cultivation practices are more susceptible to these climate changes. Vertical farming is a type of agriculture that uses structures to protect crops from pests, diseases, and insects. Vertical farming for vegetables is often done using nets and sticks. One common way to use nets and sticks for vegetable farming is to create a raised bed. This helps to improve drainage and aeration, and it also makes it easier to weed and harvest the crops. Vertical farming can help to increase crop yields by protecting the crops from pests, diseases, and extend the growing season.

Drip Irrigation System

Drip irrigation is a method of irrigation that delivers water directly to the roots of plants. This method is more efficient than traditional methods of irrigation, such as flooding or overhead watering, because it minimizes water loss due to evaporation and runoff. Drip irrigation can be used to irrigate newly planted orchards in Swat and Dir Lower. This is important because orchards are susceptible to water stress, especially during the dry season. Drip irrigation can help to ensure that the trees have the water they need to grow and produce fruit. Drip irrigation can help to conserve water, minimizes waterlogging and erosion and can reduce labor costs by eliminating the need to water orchards manually.

Use of Drought & Disease Resistant Varieites

Wheat and maize are under threat from climate change in the target areas. The quantity and quality of these crops are being affected, and yields are being reduced. Climate change is causing more extreme weather events, such as droughts and erratic rain. These events are making it difficult for farmers to grow wheat and maize. In addition, climate change is causing pests and diseases to become more common which are affecting the yield and quality of wheat and maize. For example, farmers face challenges of rust and smut disease occurrence on wheat and the borer attack on maize along with lodging but do not know how to manage. Farmers have no access to drought- and disease-resistant varieties of wheat and maize and using conventional practices in sowing, harvesting, threshing, and storing. The conventional practices are not sustainable and are not effective in mitigating the impact of climate change. Drought resistant varieties of wheat are NIPA Lalma, PS 05, Shahkar 13, PS 15, Wadan 17, PS 19, PS 21, Taskeen 22 and Khyber 2023. In case of maize, the short season varieties are white varieties; Pahari and Iqbal. The mid-season white varieties are; Azam, Saad and Babar (hybrid) and full season white varieties are; Jalal, Kaptan

Drought Tolerant Fruit Orchards Establishment

Peach is the dominant and leading fruit in Swat. However, climate change is affecting the yield and quality of peach. Therefore, it is important to diversify crops and plant other fruits that are more resilient to climate change. When establishing a new orchard, it is important to choose the right location. The location should be well-drained and have good soil quality. It is also important to consider the climate of the area and the pests and diseases that are common in the area. Here are some fruits that are drought tolerant or need less water are; apricots, persimmons, pomegranate, almond and olives.

Fruit Fly Control with Traps in Peach

Fruit fly is a serious problem in fruit and vegetables in district Swat. In Peach fruit fly is severe. The current climate change has serious impact on peach like hail storm, erratic rain causing fruit damage and creating conducive environment for fruit fly. In addition, the climate change variables also cause fruit drop which can become host for larvae and remain till the next season ready for attack. Traps for fruit fly can be used to catch adult flies. This can help to reduce the number of flies that lay eggs on the fruit. The eggs of fruit fly are the ones that cause damage to the fruit. They burrow into the fruit and feed on the flesh, causing it to rot. Traps are baited with pheromones. Pheromones are chemicals that are released by fruit fly to attract other fruit fly. Traps can be placed in peach orchards, check regularly and any captured flies should be removed. Traps for fruit fly are a relatively safe and effective way to control this pest. They are not harmful to the environment or to human health. However, it is important to note that traps are not a complete solution to the problem of fruit fly. They can be used in conjunction with other cultural practices like removal of drop fruit and bury in soil, proper pruning and nutrition.

Tomato Nursery Raising Technology

Tomato is the cash crop in Swat and farmers are extensively growing in summer season (Jun to Oct). Climate change has negative impact on tomato crop production. Erratic rain and hailstorm damage tomato nursery and standing crops and thus yield is affected. The use of plastic trays for tomato nursery raising is proposed. Plastic trays provide a more uniform growing environment, which results in healthier and more vigorous seedlings. Plastic trays are easier to clean and disinfect than the ground, which helps to prevent the spread of diseases. Plastic trays can be easily filled with soil and planted with seeds, which saves time and effort. Plastic trays allow for better drainage and aeration, which helps to prevent waterlogging and root rot. Besides tomato nursery, the trays can also be used for nursery raising of other vegetables.

Farmer's Field School (FFS)

A Farmer Field School (FFS) is a participatory learning and action approach to agricultural extension that is designed to improve the knowledge and skills of farmers so that they can make informed decisions about their farming practices. FFSs are typically facilitated by a trained extension worker who works with a group of farmers to learn about a particular agricultural topic. The group meets regularly over a period of time to discuss the topic, share experiences, and learn from each other. Improved knowledge and skills: Farmers who participate in FFSs gain a better understanding of agricultural practices, such as crop rotation, pest management, and water management. Farmers who participate in FFSs often see an increase in their yields. This is due to the improved knowledge and skills they gain, as well as the opportunity to share experiences and learn from each other. Participants find ways to reduce their costs, such as by using less fertilizer or pesticides. They are more likely to adopt new technologies, such as improved seeds or irrigation systems.

Stakeholders Identification & Analysis

There are couple of Government and Non-Government Organizations/institutions working on climate change and agriculture in Khyber Pakhtunkhwa Province. Following are the details:

District Disaster Management Unit

District disaster management authorities/units established at district level and are headed by district executive whereas respective deputy commissioners, district police officers, executive district officer (Health) and any other district-level officer appointed by the District Government are its members. The organization varies from province to province depending upon the disaster situation in the respective province/region/state. The roles and functions of the DDMUs are clearly defined by National Disaster Management Act. DDMU is more relevant department to develop disaster management plans, contingency plans, coordination of different stakeholders involved in disaster risk reduction (DRR) actions.

Department of Health

The Department of Health plays a crucial role in providing healthcare services to the general public at the grassroots level. In addition to its primary function of delivering healthcare, the health department also has a vital role in preventing and treating health hazards induced by climate change. Here are some key points highlighting the relevance of the health department in climate risk mitigation and adaptation:

1. The health department is involved in developing and implementing adaptation strategies to address the anticipated, current, and future climate change impacts on public health. These strategies aim to protect communities from the health risks associated with climate change.
2. The health department actively participates in climate change policy and planning efforts. By integrating public health considerations into these initiatives, the department helps to ensure that climate change mitigation and adaptation measures prioritize the well-being of the population.
3. Investing in health systems strengthening is a crucial approach to mitigate the adverse effects of climate change and infectious disease threats on the population. The health department plays a key role in enhancing the resilience of healthcare systems to climate-related challenges.
4. Climate change has direct and indirect impacts on health, which are influenced by environmental, social, and public health determinants. The health department works to understand and communicate these impacts, collaborating with other sectors to promote climate change mitigation and protect public health.

Department of Education

The Department of Education plays a crucial role in raising awareness about climate change within general communities, recognizing the significant influence children have as key drivers of change. By actively involving students in climate change initiatives, we can empower them to become environmental advocates and contribute to a sustainable future. One effective approach is the establishment of climate clubs in schools, providing students with a platform to engage in various activities that promote climate change awareness. Establishing climate clubs within schools enables students to actively participate in climate change initiatives. These clubs can undertake a range of activities, including speech competitions, painting and art exhibitions, essay competitions, debates, and community outreach events focused on raising awareness about climate change and its local impacts.

Public Health Engineering Department (PHED)

PHED is mandated to provide potable water and sanitation facilities to the rural population and planning and construction of mega water supply and, sewerage and drainage scheme in urban areas. The risk of water and sanitation facilities is increased during climate induced hazards, which have negative impacts on health of the local population. Incorporation of mitigation measures in design of water and sanitation facilities, can provide these facilities on sustainable basis and can effectively reduce health risks of the effected population.

Department of Agriculture Extension

Agriculture Extension department has offices in each district and staff are based at district, tehsil and Union Council level for advising farmers on best practices of agriculture. The department has dual mandate of regulating fertilizer and extension services for farmer. The Agriculture Extension Department is advising farmers to use drought and disease resistant varieties of wheat, maize and rice. Certified seed of wheat and maize varieties suitable for the target areas are available with Farmer Services Centers (FSCs). The department is managing Farm Services Center through which inputs like seed and fertilizers are provided to member farmers on price less than market price.

The climate change concept is new to Agriculture Extension Department and trying to integrate climate change with all agriculture interventions. The department has recently started climate resilience project through horticulture interventions. Orchards requiring less water were established on farmer's field and in second year drip irrigation system will be installed. The department has taken initiative on biological control of fruit fly in peach and supported farmers with traps to control it. The department is encouraging farmers to use line sowing methods specially for wheat and maize.

Department of On Farm Water Management

On Farm Water Management (OFWM) department has offices in each district and staff are based at district level for advising farmers on best water management practices for agriculture productivity enhancement. The department has the mandate of supporting farmers water saving and increasing water efficiency through lining water courses, pipe irrigation, drip irrigation and water reservoirs etc. Though the climate change concept is new, however, OFWM believes that most of their interventions are directly linked to climate change resilience.

During study it was observed that in the selected villages the farmer's linkages with OFWM are very weak and they rely on their own resources by implanting tube wells and connecting pipe for irrigation. The OFWM Department mode of operandi is that in response to application for scheme, the sub engineer visits the site and prepare feasibility accordingly.

Department of Agricultural Research

The Agriculture Research Institute Swat and Cereal Crops Institute Pirsabak Nowshera play a significant role in addressing climate change effect on Agriculture by introducing resilient varieties that may result in reduced losses due to climate change that causes abnormal rainfall, drought, storms, hailstorm, etc. The institute has introduced new varieties but there is a need to come up with new varieties in light of growing challenges due to climate change. There is no proper planning for capacity building of staff in Climate Change like conceptual clarity, hazards, adaptation, and mitigation plan.

Pakistan Meteorological Department

Pakistan Met Department (PMD) is another key stakeholder for the collection of climate information and analysis. PMD has formed specialized units along with Weather Forecasting Centre, such as Flood Forecasting Division, National Drought Monitoring Centre, Climate Change Impact & Integration Cell. Despite the formation of these specialized groups, the government has been unable to address the difficulties caused by climate change due to a lack of adequate communication channels and proper systems that assist in decision-making. For example, a regional agrometeorological center established in different selected cities of the country to collect data about soil, high and low temperature, humidity, precipitation and fog. This collected data is published fortnightly and is not available to farmers and other key stakeholders on a daily basis.

Soil & Water Conservation Department, Government of KP

This department has the mandate to increase yield per unit area by conserving soil and controlling land sliding with efficient and affordable technologies. The Department takes soil samples and analyze the status of micro and macro nutrients and recommend measures for crop production. The department disseminate soil and land practices to farmers for water efficiency and water saving which cause high crop production. This department has an important role to provide technical input for mitigation and adaptation measures against climate change impact on agriculture in the province.

Plant Protection Department, Government of Pakistan

This department has regional offices in each province to check import and export of plant materials including plants and seed at the border. The department has a mandate to control incidence of insects and diseases by checking plant materials at border. This department has important role in insect and disease management in the current climate change scenario and can provide valuable technical inputs to KP Government

Small Medium Enterprise Development Authority (SMEDA)

SMEDA is a Federal Government organization under the Ministry of Industries & Production (MoIP) with Head Office at Lahore with a provincial office and technical staff in Peshawar supporting associations and group of farmers in the preparation of proposals in horticulture and other sectors. The organization prepares pre-feasibility of potential projects which are economically viable and place on their website for investors and other relevant stakeholders.

Federal Seed Certification and Registration Department (FSCRD)

It is a Federal Government Department and has offices in each province. The mandate is approval of variety registration and certification, seed and plant nursery registration and certification.

Financial Institutions

Financial Institutions have their branches almost in each district of KP for providing credit. Some of those are Bank Alfalah, Askari Commercial Bank Limited (ACBL), United Bank Limited (UBL), Zarai Taraqiati Bank Limited (ZTBL), Muslim Commercial Bank Limited (MCB), Allied Bank Limited (ABL), Meezan Bank Limited (MBL) etc.

Food and Agriculture Organization (FAO) of United Nations

FAO works to reduce hunger, food insecurity, reduce rural poverty, ensure inclusive and efficient agricultural and food systems, and protect livelihoods from disasters. FAO with the financial assistance of couple of donors like SDC, USAID etc. are focusing on climate change impact and agriculture development across the country in general and KP in particular.

Local Adaptation Plan for Action

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
Lack of awareness and capacity in Climate Change resulting adaptation	Climate and weather	Pakistan Meteorological Department / DDMU	Weather updates should be timely issued to the community	■		
		NGOs/INGOs	Sensitize communities about the climate change risk through an intensive communication campaign	■		
		DDMU/PDMA/INGOs	Climate risk assessment study should be conducted utilizing Multi-Hazards vulnerability Capacity techniques	■		
		NGOs/INGOs	Develop knowledge products on climate change Adaptation and Disaster Risk reduction for conceptual clarity.	■		
		District Government PDMA/DDMU/NGOS NGOs	Develop protective infrastructure to protect communities from adverse impacts of riverine floods, flash floods, land sliding etc.		■	■
			Develop stakeholders' capacity on climate adaptation measure to reduce its impacts	■		
			Formation/ re-vitalization of community based organizations/groups for community based planning and implementation of community based local adaptation plans for their community	■	■	
		NGOs/ DDMU	Developing linkages and networking of community based organizations with DDMU and other line department for supporting communities in implementation of Community based adaptation Plans		■	
Adverse impacts of climate change on livelihood	**Irrigation**	Agriculture Engineering Department	Solarization of Tube well for irrigation	■		
		On Farm Water Management Department	Construction of water tank & pipe for orchards and vegetables	■		
			Rehabilitation of water channels (lining)	■		
			Use of drip irrigation system in orchards and vegetables	■		
		Soil and Water Conservation Department	Construction of check dams for control of soil erosion and decrease flood damage		■	

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
	Agriculture	Agricultural Research Institute	Development of drought and disease resistant varieties of cereal crops and vegetables			■
			Research on adjusting sowing and harvesting season of cereal crops			■
			Research on value addition of fruits and vegetables in the current climate change impact			■
			Research on finding techniques for protection of crops, orchards and vegetables from hail storm			■
		Agriculture Extension Department	Vertical Farming (Gourds, Cucumber, Chilies, Tomato)	■		
			Orchard establishment with drip Irrigation System (Almond, Persimmon and Pomegranate)	■		
			Integrated Pest and Disease Management in Peach	■		
			Climate Smart Technology for tomato nursery raising	■		
			Fruit/Forest Nursery Enterprise		■	
			Strawberry cultivation for runners	■		
			Farmer's Field School on wheat, maize, peach, onion and tomato for learning and productivity enhancement Capacity building of women food production gardens	■		
			Awareness Campaign on Climate Change Impact on Agriculture	■		
			Training of farmers on insect and disease management	■		
			Training of farmers on vertical farming	■		
			Training/exposure of farmers in High Efficiency Irrigation System	■		

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
			Training of farmers in wheat, rice and maize seed storage	■		
			Awareness Campaign on effect of use of fertilizer and pesticides	■		
			Training of farmers in Bio pesticides, bio fertilizer	■		
			Training of farmers in value addition of fruits and vegetables	■		
	Forest	Forest department	Agroforestry (plantation of forest plants on margins of field)		■	
Rise in Vector Borne Diseases	Health and hygiene	Local Communities	Promote hygiene education and awareness campaigns	■		
			Encourage the use of water filtration and purification	■		
			Construct and maintain community water storage facilities		■	
			Implement rainwater harvesting systems		■	
			Establish community-based water quality monitoring systems			■
Impacts of climate change on access to safe water and sanitation services	**Water**	Health Department	Strengthen disease surveillance and reporting systems			
			Provide training on waterborne disease prevention	■		
			Improve access to healthcare facilities and services	■		
			Conduct regular health camps in rural areas		■	
			Collaborate with local communities for health interventions		■	
	Sanitation	Department of KP	Develop and enforce regulations for water quality standards	■		
			Invest in infrastructure for safe drinking water		■	
			Support research on climate-resilient water supply systems		■	

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
			Allocate funds for waterborne disease prevention programs			■
		NGOs/CSOs/CBOs	Provide access to affordable water treatment technologies Short term	■		
			Conduct capacity-building workshops for local communities	■		
			Implement community-led sanitation initiatives		■	
			Support community-based water management projects		■	
			Advocate for policies promoting water and sanitation			■
			Implement community-led sanitation initiatives		■	
Sanitatio-Impacts of climate change on access to safe water and sanitation servicesan	Water	Local Communities	Rainwater harvesting systems: Promote the construction of rainwater harvesting structures to collect and store rainwater for domestic use during dry periods.	■		
			Community-led water management: Encourage the formation of community-based water management committees to monitor and maintain water sources, ensuring their sustainability and quality.	■		
			Water conservation practices: Raise awareness among community members about water conservation techniques such as using water-efficient appliances, fixing leakages, and practicing responsible water use.	■		
		Government	Infrastructure development: Invest in the construction and maintenance of water supply infrastructure, including pipelines, storage tanks, and water treatment facilities, to ensure reliable access to safe water.		■	
			Climate-resilient water sources: Identify and develop alternative water sources, such as deep tube wells or protected springs, that are less vulnerable to climate change impacts like contamination and depletion.		■	

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
			Policy and regulation: Develop and enforce policies and regulations to protect water sources, promote water conservation, and ensure equitable distribution of water resources among rural communities.			■
		NGOs/CSOs/CBOs	Capacity building and training: Provide training and capacity-building programs to local communities on water management, water quality testing, and maintenance of water infrastructure.	■		
			Community-based water projects: Support the implementation of community-led water projects, including the installation of hand pumps, water filtration systems, and sanitation facilities, tailored to the cultural and financial capabilities of the rural communities	■		
	Sanitation		Climate information dissemination: Facilitate the dissemination of climate information and early warning systems to raise awareness among communities about climate change impacts on water resources and promote adaptive measures.		■	
		Local Communities Government	Promote community-led sanitation initiatives, such as building and maintaining latrines and handwashing facilities.	■		
			Raise awareness about proper sanitation practices, including safe disposal of waste and personal hygiene.	■		
			Encourage the use of low-cost and culturally acceptable sanitation technologies, such as pit latrines or composting toilets.	■		
			Establish community-based monitoring systems to ensure the functionality and cleanliness of sanitation facilities.		■	

Challenge	Sector	Stakeholders	Solutions	Implementation Phase		
				Short Term	Medium Term	Long Term
			Implement rainwater harvesting systems for water storage and reuse in sanitation facilities.		■	
			Develop and enforce regulations and policies for sanitation infrastructure in rural areas.	■		
			Provide financial incentives and subsidies for the construction and maintenance of sanitation facilities.	■		
			Strengthen the capacity of local government institutions to plan, implement, and monitor sanitation programs.	■		
			Invest in the training and education of sanitation workers to ensure proper waste management practices.		■	
			Establish partnerships with NGOs and international organizations to access funding and technical expertise.			■
		NGOs and International Organizations	Support community-led sanitation initiatives through funding and technical assistance.	■		
			Conduct hygiene promotion campaigns to raise awareness and change behavior regarding sanitation practices.	■		
			Provide training and capacity building programs for local communities and government officials on sustainable sanitation practices.		■	
			Facilitate knowledge sharing and best practices exchange among different stakeholders involved in sanitation services		■	
			Advocate for increased investment in rural sanitation infrastructure at national and international levels.			■

LAsoona
Relief and Development Organization

"The **"Changing Minds for Climate Resilience through Awareness Raising and Local Capacity Measures"** is a transformative initiative spanning selected districts of Khyber Pakhtunkhwa and South Punjab. **Focused on empowering vulnerable communities—particularly women, people with disabilities, youth, and children**—the project seeks to enhance climate awareness, build adaptive capacities, and equip farmers with sustainable practices. Through knowledge dissemination and community engagement, we aim to forge a resilient front against climate change, fostering a united commitment for a sustainable future."

+92 946 9240071 info@lasoona.org www.lasoona.org
College Colony, Saidu Sharif, District Swat, Khyber Pakhtunkhwa, Pakistan