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LASOONA
Relief and Development Organization

LOCAL ADAPTATION PLAN OF ACTION

UNION COUNCIL, WANG AND RAKH KOT MITHAN

District Rajanpur

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

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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.

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Table of Contents

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Noor Malik
Head of Programmes
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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
CBO	Community-Based Organization
COMMENT	International Maize and Wheat Improvement Centre
CMIP6	Coupled Model Intercomparison Project Phase 6
COP	Conference Of the Parties
CRVA	Climate Risk and Vulnerability Assessment
DCAP	District Climate Adaptation Plan
DDMA	District Disaster Management Authority
DRR	Disaster Risk Reduction
ESM2	Earth System Models
EWS	Early Warning System
GCM	General Circulation Models
GHG	Green House Gases
MHM	Menstrual Hygiene Management
MIROC	Model for Interdisciplinary Research on Climate
NAP	National Action Plan
NCAP	National Climate Adaptation Plan
NDC	Nationally Determined Contributions
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDRMF	National Disaster Risk Management Fund
NGO	Non-Government Organization
PARC	Pakistan Agriculture Research Centre
PDMA	Provincial Disaster Management Authority
PMD	Pakistan Meteorological Department
PWD	Persons With Disabilities
SDG	Sustainable Development Goal
SFDRR	Sendai Framework for Disaster Risk Reduction
TOT	Training of Trainers
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction
WASH	Water, Sanitation, and Hygiene
WRI	World Resources Institute

SECTION 1: INTRODUCTION

1.1. Background and Purpose

Pakistan is confronted with an escalating vulnerability to climate change, grappling with a range of challenges that include rising temperatures, more frequent extreme weather events, and shifting precipitation patterns. According to the Global Climate Risk Index 2021, Pakistan ranks as the fifth most climate-vulnerable country in the world (Eckstein et al. 2021). In 2022, Pakistan endured devastating floods that impacted over 33 million people and resulted in billions of dollars in damages (Government of Pakistan 2022). These catastrophic floods were attributed to climate change, which is increasingly causing extreme weather events to become more frequent and severe. These challenges are expected to worsen over time, posing significant threats to both Pakistan's development and human security.

One of the region's most susceptible districts to the impacts of climate change is Rajanpur, situated in southern Punjab. The district already contends with the rise in temperatures and water scarcity, inherent to its arid landscapes. However, climate change looms as an additional threat, potentially leading to more frequent and severe droughts, floods, and heat waves. In 2015, a severe drought struck the district, resulting in widespread crop failures and livestock losses (Chaudhry 2017). In 2022, the district was severely affected by the devastating floods that struck Pakistan, affecting over 33 million people, and resulting in billions of dollars in damage (MoPDSI, 2022).

Acknowledging the unique climate vulnerabilities and risks faced by the district, the Local Adaptation Plan (LAPA) has been carefully developed through field visits, key informant interviews with relevant government and non-government stakeholders, and detailed focus group discussions involving both male and female participants, as well as persons with disabilities from selected union councils of Wang and Kot Mithan. These union councils have been identified by the District administration and studying the district disaster management plan as highly susceptible to climate shocks, including increased heavy rainfall, riverine, and flash floods.

Drawing from in-depth discussions utilizing the aforementioned methods, this comprehensive plan captures the insights of the targeted communities, serving as a blueprint for developing a strategic framework to address the district's climate-related challenges comprehensively. It encompasses a diverse range of adaptation measures, spanning from enhancing agriculture, healthcare, Water, Sanitation, and Hygiene (WASH), to Disaster Risk Reduction (DRR), all with the overarching goal of promoting sustainable development (refer to sections 4 & 5). Additionally, the plan proposes essential actions and financial strategies to support its implementation across the district.

It is also worth mentioning that the LAPA aligns with both the National Climate Adaptation Plan (NCAP) and the Sustainable Development Goals (SDGs). This alignment underscores the commitment to ensuring that efforts are synchronized with broader national and international sustainability

objectives. By adopting this holistic approach, the aim is not only to mitigate climate risks but also to foster sustainable development within the district.

The LAPA represents more than just a document; it signifies a proactive response to the imminent challenges posed by climate change. It highlights an unwavering commitment to safeguarding the well-being of the district's residents and conserving its natural resources. Through collaboration with diverse stakeholders, including government bodies, civil society, and the private sector, the endeavor is to fortify Rajanpur against the adverse effects of climate change. The aim is to chart a course toward a more secure, resilient, and prosperous future for all residents of the district.

1.2. Climate Change Impacts on the District

District Rajanpur in Punjab is currently grappling with a range of climate change impacts, and these effects are significantly impacting key sectors within the district. Here is an overview of these climate change impacts and their specific effects on relevant sectors:

» Rising Temperatures: Over the past three decades, District Rajanpur has experienced a significant increase in average temperatures, with a rise of 1.5°C (Chaudhry 2017). The rising temperatures have profound effects on agriculture. They are causing heat stress in crops, reducing yields and impacting the health of livestock. Farmers need to adapt by changing cropping patterns and adapting to the situation, which affects food security and rural livelihoods (Ahmad et al. 2020).

High temperatures are associated with various health risks. Prolonged heatwaves can lead to heat-related illnesses and exacerbate pre-existing health conditions. Vulnerable populations, such as the elderly and young children, are particularly at risk (Ghani et al. 2019). Adequate healthcare infrastructure and heatwave preparedness measures are essential to adapt to and manage the health impacts associated with these climate conditions.

Increasing temperatures can strain water resources, leading to water scarcity and affecting water quality. This, in turn, poses challenges to water supply and sanitation services (Ahmed et

al. 2020). Ensuring access to clean water becomes critical, as water scarcity and contamination can result in waterborne diseases and hygiene issues, affecting public health.

» More Extreme Weather Events: The district, situated near the Koh-e-Suleman range, grapples with intense weather, from the rise in temperature to freezing winters. Annual floods, affecting 80% of the area and 60% of the population, pose a significant threat to agriculture. The Katcha zone faces recurring floods from the Indus River, while the Pachadh Area contends with flash floods from the Suleiman mountains, causing damage to homes, crops, and livestock.

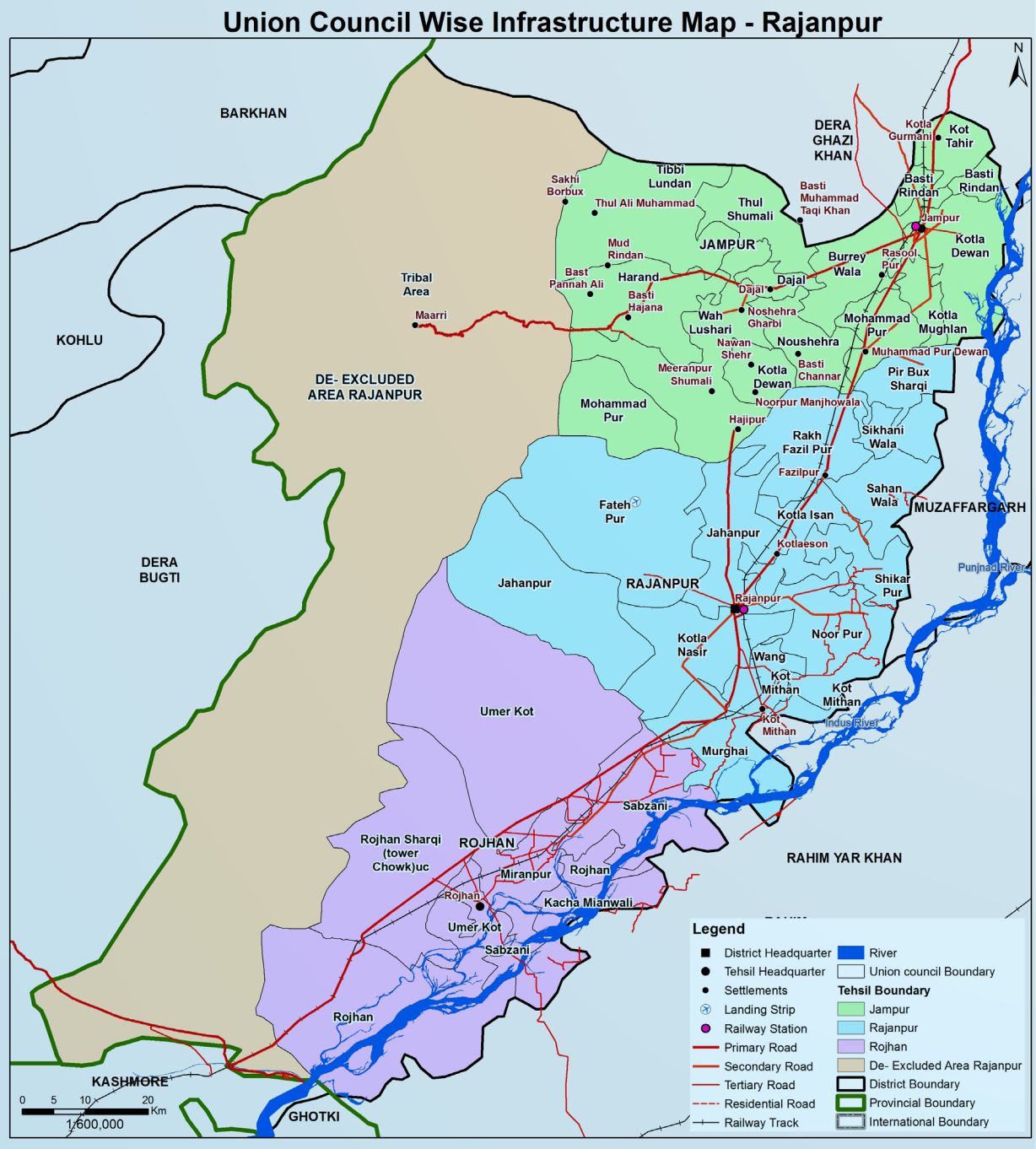
  Intensifying the agricultural impact, heavy rains in northern Pakistan and water release by India contribute to rising Indus River levels at Kot Mithan, resulting in suburban flooding. In July 2022, the river surge inflicted substantial damage to standing crops, particularly to cotton and sugarcane crops. The maximum discharge at Benazir Bridge, reaching 720,000 cusecs from Taunsa, Panjnad, and Rodh Kohi Channels, continues to rise. The convergence of all five rivers at Kot Mithan amplifies Rajanpur's vulnerability to riverine flooding, significantly affecting the region's agricultural sustainability (Government of Punjab 2022).

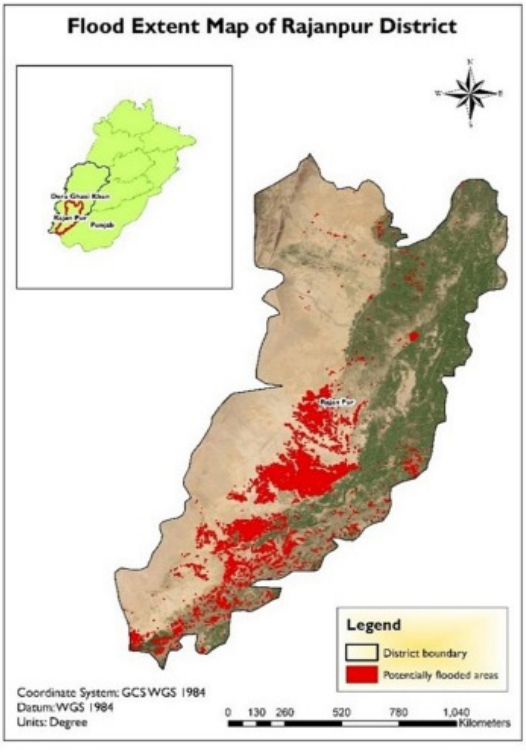
» Changes in Precipitation Patterns: District Rajanpur is witnessing shifts in precipitation patterns attributable to climate change. This includes a discernible decline in monsoon season rainfall coupled with an uptick in winter precipitation. These changes render crop cultivation more challenging and heighten the risk of flooding, impacting agricultural productivity and food security (NDMA, 2009).

  Altered precipitation patterns can impact public health by influencing the availability and distribution of water resources. Changes in rainfall can affect water quality and availability, leading to water scarcity or contamination, which can result in waterborne diseases and related health issues.

  Shifts in precipitation patterns can affect water availability and quality, which are critical factors in water supply and sanitation services (Mehmood et al. 2020). Ensuring access to clean water and sanitation becomes more challenging with changing precipitation patterns, potentially leading to WASH-related challenges and public health concerns.

District Rajanpur




Flood Extent Map of Rajanpur District
Dera Ghazi Khan
Rajan Pur
Punjab
Rajan Pur
Legend
District boundary
Potentially flooded areas
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree
0 130 260 520 780 1,040
Kilometers

1.3. Objectives of the Plan

The goal of developing the local adaptation plan is to enhance the district's resilience and sustainability in the face of climate change. The objectives of the LAPA are as follows:

- Implement effective adaptation strategies to minimize climate vulnerability.
- Empower local communities with the tools and knowledge needed to effectively respond to and recover from the impacts of climate change.
- Foster sustainable development practices that protect well-being and natural resources in a changing climate.

1.4. Target Beneficiaries

The beneficiaries of the LAPA encompass the entirety of the population living within District Rajanpur. Nonetheless, particular attention will be directed towards the most vulnerable segments of society, including persons with disabilities, gender, and minorities. children, the elderly, and those living below the poverty line.

The implementation of the LAPA will be a collaborative endeavor, spearheaded by the District Government of Rajanpur in partnership with a diverse range of stakeholders. These partners encompass the federal and provincial government, civil society organizations, and the private sector, all united in the pursuit of a more resilient and sustainable future for District Rajanpur.

SECTION 2: CLIMATE RISK ASSESSMENT

2.1. Climate Change Projections

Climate change projections were conducted for the near term (2010-2039) and mid-century (2040-2069) utilizing a Q-mapping approach and CMIP6 datasets. Employing the methodology outlined by Ahmad et al. in 2020, we carefully selected suitable General Circulation Models (GCMs) and downscaled them to a higher resolution for the study site.

Historically, there has been a noticeable temperature increase of 0.21°C from 1980 to 2010. Looking ahead, climate change projections indicate a concerning trend of rising temperatures. It is estimated that temperatures will increase by 1.2°C by 2030 and 1.8°C by 2060 in district Rajanpur.

Furthermore, the results reveal a significant warming trend over the specified periods, namely 2010-2039 and 2040-2069 (Figure 1). Projections suggest an upward trajectory in mean annual temperatures for both GCMs, with MIROC6 indicating an increase from 27.83°C to 28.78°C and NorESM2-LM from 28.30°C to 29.49°C.

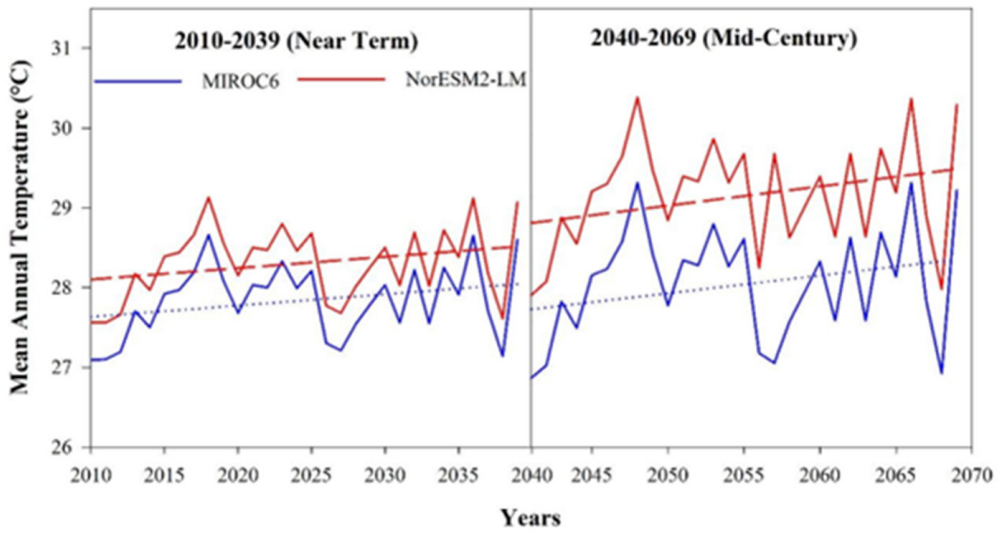
The percentage change in temperature serves as a vital indicator, reflecting the magnitude of this temperature increase. MIROC6 predicts a 0.71°C temperature rise from 2010-2039 and a more substantial 1.66°C increase from 2040-2069. Similarly, NorESM2-LM projects a 0.18°C temperature increase for 2010-2039 and a significant 2.37°C rise for 2040-2069 (Table 1).

Table 1: Future rise in mean annual temperature in district Rajanpur

GCMs	MIROC6		NorESM2-LM	
Centuries	2010-39	2040-69	2010-39	2040-69
Mean Temp (°C)	27.83	28.78	28.3	29.49
Degree Change	0.71	1.66	0.18	2.37

These temperature elevations carry profound implications for various sectors, encompassing agriculture, public health, water resources, sanitation, and disaster risk reduction. Rising temperatures may disrupt agricultural patterns, potentially affecting crop yields and triggering food security concerns. Furthermore, the direct and indirect health impacts of increased temperatures could affect vulnerable populations. Altered climate patterns may challenge access to clean water and sanitation services (WASH). Lastly, the heightened temperatures may exacerbate the frequency and severity of disasters, underscoring the need for robust DRR strategies to safeguard both the community and infrastructure in district Rajanpur.

Figure 1: SEQ Figure * ARABIC 1: Climate Change projections for near and mid-century



2.2. Climate-Induced Hazards and their Prioritization in District Rajanpur

Climate-induced hazards have emerged as a significant issue not only in the district of Rajanpur but on a national scale throughout Pakistan. In recent times, the growing frequency and severity of climate-induced hazards have underscored the immediate necessity to adapt to climate change, as they portend forthcoming challenges. These environmental threats carry substantial risks to the region's ecological balance, economic stability, and the welfare of its people. The following hydro-meteorological hazards have been prioritized by the community respondents during the discussions:

- Heavy rainfall: During the past 5 years, heavy downpours, coupled with cloud bursts and thunderstorms, have become increasingly common. These occurrences lead to flooding in agricultural fields.

- Riverine floods: The mighty river Indus that flows through the district has made riverine floods a recurring phenomenon. These events, which were present in the past, have intensified due to the increase of higher population density along the riverbanks and due to climate change implications.

- Flash floods: Flash floods, once unfamiliar, have grown in severity due to intense, brief periods of heavy rainfall that rapidly inundate streets and agricultural lands. The flash floods originating from Koh-I-Suleman have posed a significant threat to Rajanpur in recent years (NDMA, 2022).

- Heatwaves: More frequent heatwaves now pose health risks such as fainting and heatstroke among children and elderly people.

- Fog: The regular occurrence of dense fog, particularly in December, has become a common

phenomenon, resulting in road accidents and disruptions to daily work routines and commuting hours.

» Biological Diseases: Community respondents mentioned that around 70-80% of diseases have seen an uptick, partly due to lower immune system resistance and increased comfort compared to past years. Children, elderly people, women, and persons with disabilities are more frequently affected.

» Mosquito bites and Dengue Spread: Mosquito bites on humans have notably increased in frequency, particularly leading up to the monsoon season and after its retreat. This surge in mosquito activity has contributed significantly to the rising number of reported Dengue cases in the region.

2.3. Vulnerability Assessment

At the gross root level, the vulnerability to climate change is a growing concern. Various factors converge to create a precarious situation for communities, especially in areas prone to various hazards. Increased temperatures and changing precipitation patterns are impacting agriculture, the primary livelihood for many, leading to reduced crop yields and food insecurity. Additionally, people's susceptibility to extreme weather events, such as floods and droughts, has risen, leaving communities exposed to significant risks. Infrastructure and housing are often ill-prepared to withstand these climate-related shocks, leaving people vulnerable to displacement and loss. The lack of access to clean water and sanitation further exacerbates the challenges posed by climate change, as it heightens health risks. Addressing climate vulnerability at the district level is of paramount importance, as it requires localized strategies to enhance resilience, protect livelihoods, and secure the well-being of the population in the face of an increasingly unpredictable climate. The climate vulnerability and capacity assessment conducted in the field with the target communities in Rajanpur have identified the following groups that are very vulnerable to climate shocks:

» Women: Women endure challenging conditions, including sweltering heat in poorly ventilated kitchens and strenuous agricultural work, often resulting in discomfort and even fainting due to excessive perspiration. It is essential to highlight that pregnant and lactating woman, as well as newborn babies, are particularly vulnerable because they face increased exposure to extreme heat and the associated risks of flooding.

  Furthermore, women face significant challenges related to access to toilets, clean water, sanitation facilities, and menstrual hygiene during the flood season, particularly when they are staying in temporary shelter facilities.

» Children: Engaging in outdoor activities during hot weather exposes children to increased heat-related risks. Their vulnerability underscores the importance of safeguarding their well-being.

» Elderly People: The diminished tolerance of elderly people to prolonged heat can have adverse effects on their health. It is imperative to consider their unique needs and susceptibilities in the face of rising temperatures.

» Persons with Disabilities: PWDs are disproportionately affected by the ever-changing climate and weather conditions. Addressing their specific challenges is essential to ensure inclusivity and protection within the broader climate adaptation framework.

2.4. Coping Capacity Assessment

2.4.1. Capacities at the Organizational Level

During the key informant interviews conducted at various government offices, it was observed that the prioritization of climate change varied. This lack of emphasis became evident when inquiring about existing adaptive measures, as very few plans or strategies were available for sharing. It was not until the recent unprecedented rainfall and subsequent flooding that both government and non-government organizations began to acknowledge the stark reality of climate change. Nevertheless, the question of how to effectively adapt to climate change remains a challenge. Many stakeholders appear to lack the awareness and the necessary tools for climate change mitigation and adaptation.

2.4.2. Capacities at the Community Levels

Owing to limited access to education and a lack of awareness, communities possess minimal to no understanding of climate change and its potential effects on their means of living, food security, and water resources. Even though they have witnessed alterations in weather patterns and the escalation of hydro-meteorological hazards in recent years, they remain ill-equipped, primarily due to poverty and a dearth of awareness. It was observed that their adaptive capabilities are highly inadequate, with local resources, although available, often being dysfunctional and lacking the necessary repairs or retrofitting to withstand the rigors of climate extremes.

2.5. Climate Related Challenges

2.5.1. Agriculture Including Irrigation Water

Situated in the heart of Punjab, the district Rajanpur is grappling with formidable challenges in agriculture due to the relentless impact of climate change. These challenges have escalated over time, posing a significant threat to the livelihoods of local farmers and the region's food security.

a. **Droughts:** Escalating Frequency and Severity; Droughts have emerged as a critical concern in Rajanpur, experiencing a 50% increase in both frequency and severity over the past decade. In 2015, the district endured a severe drought that persisted for over a year (Chaudhry 2017), resulting in widespread crop failures and significant livestock losses. This drought also triggered severe water shortages, leading to a humanitarian crisis. According to data from the Pakistan Meteorological Department (PMD 2023a), the average annual rainfall in Rajanpur District has decreased by 10% over the last 30 years, rendering the district increasingly susceptible to droughts.

b. **Floods:** A Growing Threat Along the Indus River; Situated along the Indus River, Rajanpur faces an escalating threat from floods, with a 25% increase in occurrences over the past decade. In 2010 and 2022, the district was struck by devastating floods that inundated over 70% of the area, destroying crops and vital infrastructure. These floods displaced over a million people and incurred billions of dollars in damage. According to the National Disaster Management Authority (NDMA 2022), the 2022 flood in Rajanpur district caused extensive damage to agriculture, including crop damage to over 1 million acres of crops, including wheat, rice, cotton, and sugarcane, as well as the loss of over 205,100 livestock, including cattle, buffaloes, sheep, and goats.

c. **Heatwaves:** The Intensifying Scorching Heat; Rajanpur experiences more frequent and intense heatwaves, with a one-degree Celsius temperature increase in the last decade. In 2019, the district recorded a temperature of 53.5°C, one of the highest temperatures ever recorded in Pakistan. Heatwaves can be deadly, especially for vulnerable populations, and they can also cause severe crop damage and reduced yields. Data from the Pakistan Meteorological Department reveals that the average temperature in Rajanpur District has increased by 1.5°C over the past 30 years, heightening the district's vulnerability to heatwaves (PMD 2023b).

d. **Altered Rainfall Patterns:** Unpredictable Precipitation; Climate change disrupts historical rainfall patterns in Rajanpur, introducing greater unpredictability. Erratic rainfall disrupts crop planning, leading to fluctuations in yields, crop quality, and planting seasons. Some years witness excessive rainfall, resulting in floods, while others experience prolonged dry spells, leading to droughts. The Pakistan Meteorological Department reported (PMD 2023a) that rainfall patterns in Rajanpur District have become increasingly erratic in recent years, making it challenging for farmers to plan their crops and manage water resources effectively.

e. **Temperature Extremes:** Threat to Crop Growth; Rising temperatures pose a substantial threat to crop growth in Rajanpur. Prolonged heatwaves can induce heat stress in crops,

resulting in reduced yields and lower crop quality. Wheat, one of the district's primary crops, is particularly vulnerable to heat stress. According to a study by the International Maize and Wheat Improvement Center (CIMMYT 2022), wheat yields in Rajanpur District are projected to decline by up to 20% by 2050 due to climate change, significantly impacting farmers' livelihoods and the district's food security.

f. **Pest and Disease Outbreaks:** A Consequence of Elevated Temperatures; Elevated temperatures create favorable conditions for pests and diseases, leading to increased infestations. Some pests and diseases becoming more prevalent in Rajanpur district include whiteflies, leafhoppers, and rust. These outbreaks can cause significant crop damage and yield reductions. According to a study by the Pakistan Agricultural Research Council (PARC 2022), pest and disease outbreaks are expected to increase in both frequency and severity in the district due to climate change. Elevated temperatures and erratic rainfall patterns create favorable conditions for these pests and diseases to thrive.

g. **Water Scarcity:** Navigating Decreased Availability; Decreasing water availability is a significant concern for agriculture in Rajanpur. The district's groundwater resources are depleting, and the Indus River is becoming increasingly saline, making it challenging to grow crops and reducing yields. According to research by the World Resources Institute (WRI 2023), Rajanpur district ranks as one of the most water-stressed districts in Pakistan, primarily due to its low water table and decreasing rainfall.

h. **Reduced Water Availability:** Impact of Extreme Weather Events; Climate change-induced extreme weather events, such as droughts and floods, can disrupt irrigation systems and reduce water availability for agriculture. For instance, the 2015 drought in the Rajanpur district caused a severe water shortage, further exacerbating the already challenging agricultural conditions in the region (International Water Management Institute 2022).

2.5.2. Field Assessment from District Rajanpur

In a case study conducted by the LASOONA team in district Rajanpur, findings from a survey of 25 farmers reveal that a significant majority strongly agree with the observation of rising temperatures (83.3%), increased annual precipitation (66.7%), and more frequent heatwaves (70%). Additionally, farmers perceive a rising incidence of pests and diseases (80%) and recognize the impact of temperature fluctuations on crop yields (60%). However, there is a divided perception when it comes to the frequency of storms and cyclones, with a majority of farmers disagreeing, and most farmers also disagree with the presence of waterlogging and salinity (66.7%) (Table 2). In summary, this data underscores local awareness of climate change's effects on agriculture while indicating the need for further research and localized interventions to address specific issues."

Table 2: Climate change vulnerabilities and impacts on agriculture in district Rajanpur

A: Assessment of Climate Change & Variability					
Indicator/ Responses (%)	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
Rising Temperatures	83.3	16.7	-	-	-
Increasing Annual Precipitation	66.7	16.7	-	-	-
Escalating Heavy/ Unseasonal Rainfall Events	33.3	50	16.7	-	-
Diminishing Dry Seasons	50	50	-	-	-
Surging Heatwaves	70	30	-	-	-
Rising Frequency of Storms and Cyclones	16.7	16.7	50	16.6	-
B. Consequences of climate changes and impacts on agriculture					
Temperature's Impact on Crop Yields	60	40	-	-	-
Changing Precipitation and Crops	16.7	66.7	-	-	-
Rising Pests and Diseases in Agriculture	80	20	-	-	-
Climate Change: Waterlogging & Salinity	-	-	33.3	66.7	-
Soil Fertility Decline due to Climate Change	66.7	33.3	-	-	-

2.6. Water, Sanitation and Hygiene (WASH)

The interviews conducted in Rajanpur shed light on the significant challenges faced by communities in terms of WASH due to the impacts of climate change. These challenges have direct implications for the health and well-being of the local population.

- **Water:** In terms of water resources, the community members reported a decline in groundwater levels, poor water quality, and changes in rainfall patterns, leading to a scarcity of clean drinking water and an increased reliance on contaminated water sources. The floods and excessive rainfall have further exacerbated the situation, resulting in the contamination of natural springs and wells, leading to outbreaks of waterborne diseases such as cholera.

- **Sanitation:** The impact of climate change on sanitation facilities is another major concern reported by the communities. Sanitation facilities, such as pit latrines, are often located inside households. However, the lack of proper waste disposal mechanisms exacerbates the situation during extreme weather events like floods. Waste gets mixed with drinking water, further compromising the hygiene practices of the community. Additionally, accessing clean and dry clothes for Menstrual Hygiene Management (MHM) during floods becomes a challenge.

- **Health:** These WASH challenges have significant implications for public health. The poor availability and quality of drinking water increases the risk of waterborne diseases such as cholera, typhoid, and hepatitis. The contamination of water sources during floods and the mixing of waste with drinking water further contribute to the spread of diseases. Inadequate sanitation facilities and poor hygiene practices, exacerbated by climate change impacts, also contribute to the spread of diseases. Skin rashes, stomach issues, and respiratory problems are reported by the community members, particularly during extreme weather events.

  The challenges faced by women and girls in managing menstrual hygiene amidst climate change are also highlighted. Due to a lack of awareness about proper menstrual hygiene products and disruptions in clean water and sanitation facilities during extreme weather events, many in the community resort to using cloth instead of sanitary pads. Access to clean water and sanitation facilities becomes a persistent issue, with groundwater often contaminated, posing health risks during menstruation. Inadequate infrastructure, such as poorly maintained pit latrines, further compounds these challenges. Climate change also directly threatens women's health, as flood events contaminate water sources, increasing the risk of waterborne diseases, and particularly affecting vulnerable groups like pregnant women and young children.

  Overall, the WASH challenges induced by climate change in Rajanpur have significant implications for public health. The scarcity of clean drinking water, poor sanitation facilities, and disruptions in menstrual hygiene management pose risks of waterborne diseases and other health issues for the local population. These challenges require urgent attention and effective strategies to ensure access to clean water, improved sanitation facilities, and proper menstrual hygiene management in the face of climate change impacts.

2.7. Health

The impact of climate change on health in Rajanpur is evident through the various challenges and diseases faced by the local communities. According to the interviews conducted with community members and district health officials, significant changes in the local climate have been observed over the past ten years. The community members reported that the summer season has become longer, with higher temperatures reaching up to 50 degrees Celsius. This prolonged and intensified summer season has led to an increase in heat-related illnesses such as fever, flu, cough, headache, and skin irritations. The extreme heat waves have also resulted in the closure of schools and have negatively impacted the overall health condition of the community members.

Conversely, the winter season has become shorter by about 1-1.5 months, and the winter temperature has decreased. This lack of cold weather for the past 5-7 years has had implications for the community's health. Respiratory illnesses such as asthma have become more common during this period. The altered rainfall patterns have also affected the health of the community. During the rainy season and floods, diseases such as malaria and dengue become prevalent. The community members have reported experiencing stomach issues, diarrhea, and hepatitis A and E, which they attribute to poor-quality drinking water. The floods and excessive rainfall have further exacerbated the situation, leading to outbreaks of cholera due to contaminated water sources.

The vulnerable groups, such as children and elderly people, are particularly affected by these climate-related health issues. The district health officials confirmed the health implications of climate change-related events, such as floods and droughts. They mentioned that during floods, there is an increase in waterborne diseases like malaria, typhoid, hepatitis, and cholera. They also noted changes in the pattern of diseases over the past 5-10 years, which they attribute to climate change.

In conclusion, the changing climate in Rajanpur has resulted in a range of health challenges and diseases. The prolonged and intensified summer season altered rainfall patterns and extreme weather events have led to heat-related illnesses, waterborne diseases, and respiratory issues. These health challenges disproportionately affect vulnerable groups within the community.

SECTION 3: PROPOSED ADAPTATION MEASURES

3.1. Introduction

After conducting key informant interviews (KIIs) at various administrative levels and engaging in focus group discussions (FGDs) within the selected communities of Rajanpur District, a comprehensive array of climate adaptation strategies has emerged. These strategies encompass a diverse range of initiatives with the common objective of enhancing resilience across multiple sectors, such as agriculture, water resource management, water, sanitation, and hygiene, as well as healthcare. Additionally, there is a strong emphasis on implementing robust disaster risk reduction measures to mitigate the repercussions of severe weather events.

3.2. Proposed Measures for Climate Change Adaptation and Disaster Risk Reduction

Table 3: Proposed Structural and Non-Structural Climate Adaptation Measures

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
	3.2.1. Proposed Measures for DRR and CCA Sector					
I	Lack of awareness and ability to combat climate change and adapt to its impacts.	Establishing local climate and disaster resilience committees	Local govt, DDMA, CBOs/ NGOs	X		
II	Insufficient understanding of the connection between climate change and the occurrence of disasters.	Create a comprehensive training toolkit on various aspects of disaster and climate resilience.	DDMA, CBOs/ NGOs	X		
III		Carry out Training of Trainers (TOT) courses, followed by training sessions, and awareness campaigns focused on disaster preparedness and adapting to climate change.	DDMA, CBOs/ NGOs	X		

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
IV	A weakened early warning system with reduced capacity to access crucial early warning information.	Strengthening the community-based early warning system through the provision of equipment and kits	PMD, DDMA, Local DM committees	X		
V		Promote the understanding of local climate patterns, warning signs, and early response actions through a series of awareness sessions	PMD, DDMA		X	
VI	Limited capabilities in responding to disasters and climatic disturbances.	Conducting simulation exercises and physical drills	CBOs/ NGOs and Local committees	X	X	X
VII	Decreased capacity of disaster management authorities to maintain records of disasters and climatic fluctuations.	Provision of hard and soft components used for data collection and analysis at the PDMA and DDMA	PDMA, DDMA		X	
VIII	Insufficient information and prioritization of hazard and risk data at the village and union council levels.	Undertake climate vulnerability, capacity, and risk assessments in the most susceptible villages and tehsils, with subsequent extension to the district level.	CBOs/ NGOs and local committees	X	X	
IX		Formulate a district-level climate risk profile by consolidating data from the climate risk and vulnerability assessment	Department of Env, and DDMAs		X	
X	Limited capacity to respond to various types of emergencies.	Impart training on effectively utilizing this data for rapid emergency responses.	PDMA and DDMA	X	X	X

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
XI	Increasing concerns regarding the indiscriminate cutting of trees and deforestation.	Reforestation initiatives, by growing climate resilient plants that suit the local environment	Department of Forest, CBOs/ NGOs		X	X
XII	Deteriorated infrastructure, lacking building codes, and lack of adequate maintenance of public assets.	Retrofit and build resilient infrastructure, including bridges, and roads to withstand natural disasters such as floods and drought.	Department of C&W, DDMA	X	X	X
XIII	Absence of community-level resilience mechanisms, coupled with reliance on single sources of livelihood.	Supply necessary equipment and enhance their livelihood assets to enable them to manage their businesses effectively.	Department of Social Welfare, CBOs, and NGOs		X	
XIV	Deteriorated infrastructure, lacking building codes, and lack of adequate maintenance of public assets.	Climate-smart schools through retrofitting and repairing, and solarization	Department of C&W, and Education		X	
XV	Absence of professionally trained engineers, masons, and farmers with knowledge and skills in climate and disaster resilience.	Training of engineers, masons, and other associate stakeholders on constructing climate-smart and disaster-resilient houses.	Technical inst, NGOs, UN		X	

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
	3.2.2. Proposed Measures for the Health Sector					
I	Prolonged and intensified summer season with extreme heatwaves leading to heat-related illnesses	Installation of shading structures combined with tree plantation in public spaces and schools to provide relief from extreme heat	Public Health Engineering Division	X		
II		Provision of free or subsidized access to fans for vulnerable populations	Local NGOs	X		
III		Conducting public awareness campaigns on heatwave preparedness and the importance of staying hydrated	Local CBOs/ NGOs	X		
IV		Distribution of educational materials on heat-related illness prevention	Local CBOs/ NGOs	x		
V	Shortened winter season with increased winter temperatures leading to respiratory illnesses	Improvement of indoor air quality through proper ventilation systems in schools, hospitals, and public buildings	House-holds/Local NGOs		X	
VI		Distribution of respiratory masks to vulnerable populations during peak pollution periods	Local CBOs/ NGOs	X		
VII		Public awareness campaigns on indoor air pollution and its impact on respiratory health	Local CBOs/ NGOs	X		
VIII	Altered rainfall patterns causing floods and waterborne diseases	Promotion of green spaces and tree planting to improve air quality	Local CBOs/ NGOs/Pub-lic Health Engineering Division			X
	3.2.3. Proposed Measures for WASH Sector					
I	Decline in groundwater levels, poor water quality, changes in rainfall patterns leading to scarcity of clean drinking water	Construction of small-scale water storage reservoirs or ponds for rainwater collection	Public Health Engineering Division	x		

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
II	Floods and excessive rainfall contaminate natural springs and wells, leading to outbreaks of waterborne diseases	Installation of hand pumps or tube wells in strategic locations	Public Health Engineering Division		X	
III	Increased reliance on contaminated water sources	Promotion of water conservation practices	CBOs/NGOs	x		
IV	Contamination of natural springs and wells during floods	Construction of community elevated water supply systems or raised water storage tanks	Public Health Engineering Division/ NGOs		X	
V	Poor availability and quality of drinking water	Installation of community-based water treatment plants or filtration systems	Public Health Engineering Division/ CBOs/NGOs			x
VI	Risk of waterborne diseases due to poor water quality	Implementation of regular water quality testing and monitoring programs	Public Health Engineering Division	x		
VII	Lack of awareness about proper water handling and storage practices	Community awareness campaigns on proper water handling and storage practices	CBOs/NGOs	x		
VIII	Lack of proper waste disposal mechanisms exacerbating sanitation issues during extreme weather events	Construction of raised pit latrines or elevated sanitation facilities	Public Health Engineering Division		X	
IX	Waste getting mixed with drinking water during floods	Establishment of community waste management centers or recycling facilities	Public Health Engineering Division			x

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Me-dium Term	Long Term
X	Disruptions in clean water and sanitation facilities during extreme weather events	Community awareness campaigns on proper waste management practices	CBOs/NGOs	x		
XI	Inadequate infrastructure for menstrual hygiene management	Training programs for local communities on waste management techniques	CBOs/NGOs		x	
XII	Poorly maintained pit latrines exacerbate menstrual hygiene challenges	Upgrading existing sanitation facilities	Public Health Engineering Division/ NGOs			x
XIII	Lack of capacity for maintenance of sanitation facilities	Capacity building and training programs for local communities on sanitation facility maintenance and hygiene practices	CBOs/NGOs		x	
	3.2.4. Proposed Measures for the Agriculture Sector					
I	Limited access to climate-resilient crop varieties (heat/ drought tolerant) due to lack of awareness	Promote Climate-Resilient Crop Varieties (Heat/ Drought tolerant crop)	Agriculture Department Punjab (Re-search)			x
II	Water scarcity and inefficient irrigation systems	Improve Irrigation Efficiency (Rasied bed sowing of wheat/ Alternate Wettigna and Drying in Rice)	OnFarm Water Man-agement Department		x	
III	Degraded soil health and nutrient depletion	Enhance Soil Health and Nutrient Managemen (fertigation)	Agriculture Department Punjab	x		
IV	Monoculture farming leading to soil degradation and reduced productivity	Crop diversification by inclusion of restorative crops (preferably legumes and oilseeds) for better resource use efficiency	Agriculture Department Punjab (Ex-tension)	x		

S #	Challenge	Solutions	Stake holders	Implementation Phase		
				Short Term	Medium Term	Long Term
V	Limited access to climate information and early warning systems for farmers	Establish Community-Based Climate Information Centers	Deaprtment of Agriculture Extension	x		
VI	Vulnerability to crop losses due to extreme weather events and lack of insurance coverage	Strengthen Market Linkages and Crop Insurance (Weather index based insurance)	Agriculture Extension		x	
VII	Pest outbreaks impacting crop yields	Artificial intelligence (AI) for identification and forecasting of pest attack for early warning system	Universities (UAF, MNSUAM, UAAR)		x	
VIII	Soil erosion and low carbon sequestration rates	Promote agro-foresty to improve soil health and sequester carbon.	Department of Agriculture Extension	x		
IX	Overgrazing leading to land degradation	Encourage rotational grazing practices to improve pasture health and reduce overgrazing.	Livestock Department		x	
X	Pest infestations affecting crop yields	Promote Intergarted Pest Management Practices (Encourage the use of natural enemies such as predators and parasites to control pests)	Pest Warning & Quality Control Pesticides	x		
XI	Lack of knowledge and skills on climate-smart agriculture practices among farmers	Conduct training programs to educate farmers about climate-smart agricultural practices and their benefits.	Department of Agriculture Extension	x		
XII	Limited access to information and technology	Provide extension services to disseminate information about climate-smart practices and technologies.		x		

SECTION 4: IMPLEMENTATION MECHANISM FOR THE ADAPTATION PLAN

4.1. Introduction

In the development of the implementation structure for the Local Adaptation Plan, it is essential to establish a governance framework, define timeframes for short-, medium-, and long-term projects/ programs, and engage committed partners to mobilize resources for executing the action plan. Recognizing these immediate requirements, the action plan will present a comprehensive framework to identify and coordinate various stakeholders over the next decade. This will be achieved through a holistic strategy aimed at creating “Climate and Disaster Resilient Communities.

4.2. Implementation Mechanism

The aforementioned implementation mechanism will be put into action through the establishment of a dedicated committee known as the “Climate Adaptation Implementation Committee”. The proposed structure is as follows:

- Chair: Deputy Commissioner
- Secretary: Department of Environment
- Members: District Heads of Agriculture, Irrigation, Social Welfare, Forest, Civil Defense, Health, Education, C&W, DDMA, and representatives from NGOs operating in District Rajanpur.

The committee’s role and responsibilities will encompass guiding implementation, resource mobilization, sustaining building initiatives to enhance the skills and knowledge of local government officials, community leaders, and technical experts involved in climate resilience projects, approval of programs/projects, and the task of reviewing and updating the adaptation plan as required when circumstances necessitate changes.”

4.3. Coordination Mechanism, including Partnership and Collaboration

- The committee will establish robust coordination through the scheduling of regular meetings and the exchange of information among committee members, as well as with pertinent departments and other relevant stakeholders.
- Members of the committee will convene a meeting every six months to review progress and establish milestones for the next phase.
- By implementing a coordinated information-sharing system, the aim is to strengthen the

capabilities of the involved stakeholders, key departments, and other relevant partners.

» The committee will ensure to kickstart of collaborative disaster and climate resilience programs/projects to address shared interests involving both government and non-government stakeholders as well as the broader community.

4.4. Resource Mobilizations

To enhance administrative capabilities in building disaster and climate resilience, it is imperative to establish a robust financial strategy to address unexpected events and facilitate the mobilization of resources as needed. Consequently, the committee will take steps to involve non-governmental organizations, the United Nations, donors including the National Disaster Risk Management Fund (NDRMF), Asian Development Bank (ADB), and World Bank, etc., philanthropists, and local political leaders in investing in and supporting the implementation of the climate adaptation plan.

Additionally, the committee will place a high priority on fostering cooperation and advocating for public-private partnerships, aiming to involve financial institutions in actively participating in the plan's implementation.

4.5. Monitoring and Evaluation Mechanism

To ensure the effective implementation of the District Rajanpur Adaptation Plan in Punjab, a robust Monitoring and Evaluation (M&E) process is essential. This M&E process provides a structured framework for assessing the plan's progress, effectiveness, and impact in the district. By following a systematic series of steps, we can gauge how well the adaptation strategies are meeting their objectives and make informed decisions for adjustments and improvements.

i. Data Collection and Baseline Assessment In this initial phase, a dedicated M&E team will be assembled to carry out data collection and establish a baseline assessment for the adaptation plan in District Rajanpur. This includes the collection of essential baseline data, customized to the district's specific needs. Key indicators such as crop yields, soil salinity levels, water usage, and livestock survival rates will be measured, and specific, measurable indicators aligned with the plan's targets will be defined.

ii. Regular Progress Monitoring: After setting the baseline, a systematic data collection and reporting system will be implemented. Regular intervals, such as annual or biannual assessments, will be conducted to monitor the ongoing progress of the adaptation plan. Data accuracy will be maintained through periodic verification checks and cross-referencing with multiple sources, where applicable. Continuous monitoring is crucial for keeping track of the plan's performance in District Rajanpur.

iii. Stakeholder Engagement and Feedback: Engagement with local communities and stakeholders

is at the heart of this M&E process, especially in the context of District Rajanpur. Stakeholders will be actively involved and encouraged to provide feedback and share their observations based on their local experiences and knowledge. This two-way engagement ensures that the M&E process remains inclusive and responsive to the specific needs and concerns of the district's residents, guiding decisions, and adjustments accordingly.

iv. Adaptive Management and Review: As the adaptation plan unfolds in District Rajanpur, periodic reviews and policy adjustments will be essential. Data collected and stakeholder feedback will be crucial in making informed decisions. External evaluations will be periodically commissioned to provide an independent assessment of the plan's progress and impacts. These evaluations ensure that the adaptation plan remains dynamic and responsive to changing conditions within the district.

v. Accountability and Transparency: Accountability and transparency are paramount in District Rajanpur's adaptation process. Responsible organizations and agencies will be held accountable for the outcomes of the adaptation plan. Detailed records of data, findings, and evaluation reports will be maintained and made accessible to the public, stakeholders, and government agencies. Public awareness and education efforts will inform the community about the adaptation plan's objectives, progress, and benefits. Lessons learned from the M&E process will be shared to inform future climate adaptation initiatives in the district, fostering a culture of continuous improvement and knowledge sharing.

SECTION 5: LIST OF ANNEXURES

Annexure 1: Data Collection and Analysis Methodology

Data Collection

The sampling methodology utilized in this study was a combination of purposive and convenience sampling. Purposive sampling was employed to select Key Informants from government officials, while convenience sampling was used to select participants for FGDs from the local communities.

Data collection involved a multi-step process. Firstly, each of the three experts conducted a desk review to gather relevant information and familiarize themselves with the existing literature on climate change impacts and adaptation strategies in District Rajanpur. This step helped in developing a comprehensive understanding of the research context.

After the desk review, the experts proceeded to the field, accompanied by field/technical officers from the LASOONA team. The field supervisor played a crucial role in introducing the experts to the stakeholders who had already been identified by the LASOONA team. This ensured that the experts had access to a diverse range of stakeholders, including government officials and local community members.

In total, each expert conducted 28 interviews, including 4 KIIs and 12 IDIs with government officials and 12 FGDs with local communities. The table below provides a distribution of interviews conducted by three experts. The KIIs and IDIs provided valuable insights into the policy and decision-making processes related to climate change adaptation in District Rajanpur. On the other hand, the FGDs allowed for a deeper understanding of the perspectives and experiences of the local communities regarding climate change impacts and adaptation measures.

Table 4: Distribution of Interviews Conducted

	Type of Interview			
Expert	**KII – Government Stakeholders**	**IDI – Community**	**FGD**	**No. of Interview(s)**
Agriculture Expert	1	4	4	9
DRR Expert	2	2	4	8
Health & WASH Expert	1	6	4	11
Total	**4**	**12**	**12**	**28**

Data Analysis

The data analysis process involved several steps to ensure rigor and reliability. Thematic grid analysis was employed as the primary method for analyzing the collected data. This approach involved the

identification of key themes and patterns within the data, which were then organized into a thematic grid for further analysis. To enhance the validity and reliability of the findings, triangulation was employed. Triangulation involves the use of multiple data sources, methods, and researchers to cross-validate the findings. In this study, triangulation was achieved by combining data from Desk Review, KIIs, IDIs, and FGDs, as well as involving multiple experts in the data collection process.

During the data analysis phase, the experts carefully reviewed and coded the transcribed interviews and FGDs. They identified recurring themes, patterns, and emerging concepts related to climate change impacts, vulnerabilities, coping capacities, and adaptation strategies in the district. The thematic grid served as a framework for organizing and analyzing the data, ensuring a systematic and comprehensive analysis.

Overall, the sampling and data analysis methodologies utilized in this study aimed to capture a diverse range of perspectives and experiences related to climate change adaptation in Rajanpur. The combination of purposive and convenience sampling, along with thematic grid analysis and triangulation, helped to provide a comprehensive and robust analysis of the collected data.

Annexure 2: Glossary of Terms Used in the Plan

- **Adaptation:** The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to the expected climate and its effects.

- **Adaptation to Climate Change:** Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected Climate Change effects are known as adaptation to climate change. Crucial to reducing vulnerability to Climate Change, understanding how individuals, groups, and natural systems can prepare for and respond to changes in climate is known as adaptation.

- **Biodiversity:** Variety of plant and animal life in the world or a habitat or ecosystem.

- **Climate:** The statistical description in terms of the mean and variability of relevant quantities over a period ranging from months to thousands or millions of years. The classic period for averaging these variables is 20 to 30 years. The relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

- **Climate Change:** A change in the state of the climate that can be identified (for example, using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or

land use.

» **Climate Change Adaptation:** Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities is known as Climate Change Adaptation.

» **Climate Change Impacts:** The effect of climate change on natural and human systems is known as climate change impacts. Depending on the consideration of adaptation, one can distinguish between potential impacts and residual impacts.

» **Climate Change Mitigation:** Strategies and policies that reduce the concentration of greenhouse gases in the atmosphere either by reducing their emissions or by increasing their capture are known as climate change mitigation.

» **Disaster:** severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery. See UNISDR Global Assessment Report on Disaster Risk Reduction 2015.

» **Disaster Risk Reduction:** Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

» **Drought:** A period of abnormally dry weather long enough to cause a serious hydrological imbalance.

» **Early Warning System:** The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss.

» **Exposure:** The situation of people, infrastructure, housing, production capacities, and other tangible human assets located in hazard-prone areas.

» **Global Warming:** The gradual increase, observed or projected, in global surface temperature, as one of the consequences of radiative forcing caused by anthropogenic emissions.

» **Greenhouse Gases (GHGs):** Natural and industrial gases that trap heat from the earth and warm the surface. The Kyoto Protocol restricts emissions of six greenhouse gases: natural (carbon dioxide, nitrous oxide, and methane) and industrial (perfluorocarbons, hydrofluorocarbons, and sculpture hexafluoride).

» **Greenhouse Effect:** The insulating effect of certain gases in the atmosphere, which allows solar radiation to warm the earth and then prevent some of the heat from escaping.

» **Resilience:** The capacity of social, economic, and environmental systems to cope with a hazardous event trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

» **Risk Assessment:** A qualitative or quantitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods, and the environment on which they depend.

» **Sustainable Livelihood:** Livelihood that endures over time and is resilient to the impacts of various types of shocks including climatic and economic.

» **Vulnerability:** The conditions that are determined by physical, social, economic, and environmental factors or processes that increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards.

» **Weather:** The state of the atmosphere about temperature, cloudiness, rainfall, wind, and other meteorological conditions. It is not the same as climate, which is the average weather over a much longer period.

Annexure 3: Global and National Strategies for Climate Change and Disaster Risk Reduction

Introduction

In this section, there will be a detailed discussion of different policies, strategies, frameworks, and plans developed by the concerned Government Department and the United Nations on Disaster Risk Reduction.

International Strategies and Framework on Climate Change and Disaster Risk Reduction

Kyoto Protocol

The Kyoto Protocol, which is a part of the United Nations Framework Convention on Climate Change (UNFCCC), was officially adopted during the third session of the conference of the parties to the UNFCCC in 1997 in Kyoto Japan. It encompasses legally binding commitments that go beyond the obligations outlined in the UNFCCC. Specifically, nations within the Organization for Economic Cooperation and Development, along with countries undergoing economic transitions, agreed to make substantial reductions in their human-caused emissions of greenhouse gases, including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The target was to achieve a minimum 5% reduction below 1990 emission levels during the commitment period spanning from 2008 to 2012 [1].

Paris Agreement - Conference of the Parties

Adopted during the twenty-first session of the Conference of the Parties (COP) in December 2015, the Paris Agreement stands at the forefront of international climate policy. Its primary objective is to constrain the rise in global average temperatures, endeavoring to keep it well below a 2°C increase from pre-industrial levels and striving to limit it to a more ambitious 1.5°C, acknowledging that this would substantially mitigate the threats and repercussions of climate change. Furthermore, the agreement's signatory parties also reached a consensus on a worldwide adaptation goal, aiming to enhance the capacity to adapt, bolster resilience, and reduce susceptibility to climate change, all while contributing to sustainable development and ensuring robust adaptation measures in line with the aforementioned temperature target. Within the framework of the Paris Agreement, each country commits to and communicates its determined, ambitious efforts as Nationally Determined Contributions (NDCs) to collectively address the challenges of climate change and fulfill the agreement's overarching objectives [2].

Sustainable Development Goals

The Sustainable Development Goals (SDGs) were endorsed on September 27, 2015, and officially came into effect on January 1, 2016. The SDGs represent a wide-reaching consensus involving various stakeholders, encompassing countries as well as non-state actors such as the private sector and non-governmental organizations, with the shared aim of attaining sustainable and inclusive economic growth, fostering peaceful, equitable, and inclusive societies, safeguarding the environment, ensuring access to clean water, promoting sustainable patterns of production and consumption, taking decisive action against climate change, and fortifying global partnerships for sustainable development. These SDGs consist of 17 distinct objectives, each accompanied by a series of related targets and a comprehensive set of quantifiable indicators utilized to monitor advancement; collectively, there are 169 targets and 230 endorsed indicators spanning the entire spectrum of the SDGs. Notably, among the 17 SDGs, Goal 13 is specifically dedicated to the urgent addressing of climate change and its consequences [3].

Sendai Framework for Disaster Risk Reduction

The United Nations General Assembly officially approved the Sendai Framework after the third United Nations World Conference on Disaster Risk Reduction, which took place in Sendai, Japan, in March 2015. The essence of the Sendai Framework represents a significant shift from the mere management of disasters to a comprehensive approach that centers on the management of existing and future risks, with the primary objective of achieving resilience-building as a central milestone by 2030. By encapsulating climate-related disasters and broader resilience-building, the Sendai Framework mirrors the broader scope of the disaster risk reduction community. Its goal-oriented framework aligns closely with the Sustainable Development Goals (SDGs), offering the flexibility to establish tailored indicators specific to each country's unique circumstances, thus promoting greater harmony with other pertinent policy priorities like adaptation. Within the Sendai Framework for Disaster Risk Reduction (SFDRR), seven global targets and four priority actions have been established to be achieved by 2030 [4].

National Policies and Strategies on Climate Change and Disaster Risk Reduction

National Disaster Risk Reduction Policy

Following the enactment of the National Disaster Management Act in 2010, the Government of Pakistan crafted the "National Disaster Risk Reduction Policy" in 2013. This policy serves as a comprehensive guiding framework for managing disaster risks throughout the country. It has been developed through a thorough examination of assessments, pertinent frameworks, policies, and plans. The national disaster risk reduction policy offers a comprehensive assessment and discussion of both natural and human-induced hazards. It outlines strategies for managing risks and reducing vulnerability to these hazards. Additionally, the policy encompasses measures geared toward fostering resilience, risk awareness, and sustainable development practices. These measures are essential for minimizing the impacts of both natural and human-made disasters. Moreover, the policy delineates decentralized responsibilities for the implementation of disaster risk reduction measures, extending from the provincial level down to the district and sub-district levels [5].

National Disaster Management Plan

To put the national disaster risk reduction policy into effect across the country, a ten-year National Disaster Management Plan (NDMP) was formulated, spanning from 2012 to 2022. This plan delineates the roles and responsibilities of various stakeholders, including the federal government, provincial authorities, district, and local governments, as well as non-governmental entities such as community organizations, civil societies, and business enterprises. Consequently, it assumes a pivotal administrative role in safeguarding both lives and livelihoods against the onslaught of disasters. Furthermore, the NDMP outlines a comprehensive approach to managing the entire spectrum of disasters. It achieves this by formulating policies, strategies, measures, and concrete actions involving all stakeholders and by bolstering institutional capabilities, as well as human and material resources for activities related to disaster mitigation, prevention, preparedness, response, and recovery. Though, the NDMP was outdated during 2022, however, it is still intact as the NDMA is in the process of developing a revised NDMP shall be available for wide circulation [6].

National and Provincial Climate Change Policies

Pakistan's National Climate Change Policy of 2021 represents a crucial step in the country's commitment to address the pressing issue of climate change. This comprehensive policy framework aims to mitigate the adverse effects of climate change while fostering sustainable development. It focuses on reducing greenhouse gas emissions, enhancing resilience to climate impacts, and promoting green and clean energy sources. The policy emphasizes the importance of international cooperation and partnerships to tackle global climate challenges. Furthermore, it underscores the need for climate adaptation measures, including water resource management, afforestation, and climate-smart agriculture, to safeguard Pakistan's vulnerable ecosystems and communities from climate-related risks. Overall, Pakistan's 2021 National Climate Change Policy signals the nation's dedication to combating climate change while pursuing sustainable socio-economic growth.

National Adaptation Plan

To fully implement the National Climate Change Policy, the Ministry of Climate Change approved the National Adaptation Plan in 2023 which stands as a visionary blueprint for a climate-resilient and

prosperous future. It symbolizes a call to action, urging all stakeholders to unite and forge a path of transformation in the face of climate adversity. By prioritizing adaptation and implementing the NAP's strategies, Pakistan can not only mitigate the growing risks but also seize the limited but real opportunities for sustainable economic growth and social inclusivity. It presents a unique and pivotal opportunity for the nation to take the lead, becoming a beacon of inspiration for the rest of the world in the critical battle against climate change. The 2023 plan outlines a comprehensive approach to adaptation across various sectors, such as agriculture, water resources, infrastructure, and health, while Disaster risk reduction is a cross-cutting issue embedded in all sectors [7].

Alignment of the Plan with the Existing Policies and Strategies

Considering the policies and plans developed at both the global and national levels, the Government of Pakistan is unwavering in its commitment as a signatory to international agreements and frameworks related to climate change and disaster risk reduction. This commitment at the local level is also essential to remain aligned with global and national goals. Pakistan's position as one of the top ten countries most severely impacted by climate change, as per the Global Climate Risk Index 2019, underscores the urgency of these commitments. Recent years have witnessed significant alterations that have heightened the scale, frequency, and unpredictability of climate-induced disasters, disproportionately affecting the livelihoods and infrastructure of people residing in hazard-prone regions. To effectively address these pressing issues, it becomes imperative to grasp the intricate relationship between climate change and disaster risk reduction.

Furthermore, aligning local adaptation plans with international and national commitments not only bolsters Pakistan's credibility and commitment on the global stage but also maximizes resource efficiency. This approach integrates climate change adaptation efforts by drawing lessons from the experiences of other countries, attracting donors to invest in DRR and climate change adaptation. Furthermore, it also eliminates the duplication of efforts and optimizes the allocation of funds and resources. Such alignment ensures that investments made in various sectors effectively contribute to building resilience and mitigating climate-related risks.

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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.

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