



## The Impact of Climate Change on the Survival of Communities in Skardu

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### Abstract

*Climate change poses a significant threat to communities around the globe, particularly in vulnerable regions like Skardu, located in Pakistan's Gilgit-Baltistan area. This research explores the impact of climate change on the survival of these communities, focusing on environmental, social, and economic dimensions. Using a qualitative approach, the study combines qualitative interviews analysis to highlight key challenges and propose sustainable solutions. The findings indicate severe impacts on agriculture, water resources, and local livelihoods, underscoring the urgent need for adaptive measures and policy interventions. This study will crucial in the understanding the local communities trouble and to addressing the alternative mean in curbing the future coming irreparable damages to coming in their life .So this is based on common prescription reflecting the insights of indigenous and native masses living their life in the domino of mountain .*

### Keywords

Skardu, Climate Change Communities, Survival, Life

### Introduction

Skardu, nestled in the northern mountainous region of Pakistan, is renowned for its natural beauty and rich cultural heritage. However, this region faces a growing threat from climate change, manifesting in glacial melting, unpredictable weather patterns, and extreme events such as floods and landslides. These challenges jeopardize the survival of local communities, many of whom rely on agriculture and tourism for their livelihoods.

This paper examines how climate change affects Skardu's communities and evaluates existing adaptation strategies. By providing a detailed analysis, it aims to inform policymakers and stakeholders about effective measures to mitigate these impacts.

The climate change is having worst impacting for the survival of communities in Skardu, being situated in mountain region of northern area of Pakistan .This area is mainly dependent on the source of glaciers for survival of life is having castrophic impact by rapidly melting because of hike in temperature is excreting the problem glacial and outburst of floods and unpredictable of rising water bone diseases for masses of community as well as also have irreparable and chronic effect to sector of livestock ,agriculture and due to shifting of weather pattern also leading problem for crops growth and reduce it production and effecting the water crisis for the purpose of water of drinking and irrigation challenges is having adaption have adverse effect allowing to have the effect and organized mechanism to cope with these challenges for having long term effects in face of climate change.

Gilgit Baltistan is located in the northern region of Pakistan .Having situated it position in the middle of confluence two mountain range of Karakoram and Himalaya ,is having worst and chronic effect due to the alter change made in pattern of weather cycle. Being situated in deep and in the landscape of mountains region mainly local communities are mainly dependent on natural resources such as of water ,land and agriculture for their survival of life and livelihood having less means as alternative for survival of life . The region of Skardu is located in extremely middle of mountains and having threating spot due to presence of mighty glacier and mighty mountains and unique is having

risk due to sharp hike in temperature region In recent years, the accelerating climate change has marked very serious and alarming threat to the game of survival for communities in this region, impacting disaster and damaging their environment, economy, and way of life.

The one of most visible and dangerous factor which is having worst consequences in Skardu is rapidly melting of glacier. Skardu being home to multiple world largest glaciers and located in Polar region having serve as vital source of freshwater and for masses and local population. The rapid melt of glacier is having worst impact by having lake outbursts floods leading to endangering the villages, agricultural and infrastructure. This outburst of lake and floods is more executing the destructives both the lives and livelihoods of common masses of In addition to glacial flooding, changes in weather patterns have made farming and livestock rearing—two primary sources of income for the inhabitants—more unpredictable. Erratic rainfall, longer droughts, and harsher winters are altering growing seasons and affecting crop yields. This is a significant challenge for communities that rely on subsistence agriculture. Adding to this the climate changes is also having the worst consequences to system of biodiversity of region ,due to shoot up numerous kinds of plant and animal species get worst effect and comes in challenges of survival because of having gap of balances and having far reaching effects on the region resources system .

### **Problem Statement**

The alter of climate change has marked the melting of glacier has made the disturbance of weather patterns of Skardu, and increased frequency of extreme weather events in the region. All these changes have very serious and irreparable profound implications for the survival of lives of the people of Skardu

### **Research Objective**

To discuss and analyze how the climate changes the live-hoods of people in Skardu for their survival and effected made as the result of this change.

### **Contribution to Study**

The current study will be helpful to investigate the various that deal with climate change is affecting communities in high altitude; glacier regions like Gilgit Baltistan .This findings would be helpful national and regional policies on climate adaptation, disaster risk reduction and sustainable development in region. This study will also provide a voice to voice less communities and marginalized to become support and their resources.

### **Research Questions**

1. How are climate change impacting agriculture, water resources, and food security in Gilgit-Baltistan?
2. How the climate changes impacting the sector of agriculture, water resources in Skardu?

### **Climate Change Impacts on Agriculture in Skardu, Baltistan**

The Sector of Agriculture cannot remained immune to having vested impact by the alter the changed imposed by weather pattern. Because whole the agriculture depends on the glacier and lake water which is being getting shrink due to having less snow falling. Which is reducing the crops production and also made the numerous sector at the stake of problem concerns by having no means of employment sources to feed their siblings and whole house hold .Agriculture sector comes in serious crisis due to mismanagement of irrigation water mechanism to having watering of whole agricultural land. Due to changing of temperature is making the disease in the crops which is having decreasing the productivity of crops produce in region in Skardu.

### **Impact on Livestock in Skardu -Baltistan**

The sector of livestock also remained unthread by the climate changes pattern. Because of the variation imposed leading challenges and making unstable for local economy by having less productivity. Farmers in Skardu is having deep concern with the changing in front of them is leading condition of challenges for them .Due to rise of temperature is having the imposed of the different disease in the animals and spread different kinds. Which is creating a serious challenge for the livestock in region of Skardu?

### **Changes in Rainfall Patterns and Impact on Agricultural Productivity**

Changes in rainfall patterns due to climate change are another pressing issue in Gilgit-Baltistan. Traditionally, agriculture in this region has relied on consistent patterns of precipitation, with snowmelt from glaciers providing much-needed water during the growing season. However, erratic rainfall and prolonged periods of drought are disrupting this balance.

Decreased and unpredictable precipitation is contributing to water shortages, negatively impacting irrigation systems and reducing agricultural productivity. In addition, heavy rainfall during short periods can lead to flash floods, washing away crops, destroying irrigation canals, and eroding soil, thereby threatening the survival of subsistence farmers.

### **Impact on Water Resources in Gilgit-Baltistan**

#### **Glacier Melting and its Consequences**

One of the most pronounced impacts of climate change in Gilgit-Baltistan is the accelerated melting of glaciers. The region's glaciers, which are crucial to the water supply not only in GB but also for downstream regions in Pakistan, are retreating at an alarming rate due to rising temperatures.

Glaciers in GB serve as natural reservoirs that release melt water during the warmer months, providing a consistent supply of water for agriculture, domestic use, and hydropower generation. However, with glaciers melting faster than they can regenerate, the region is witnessing an increase in glacial lake outburst floods (GLOFs). These floods, triggered by the sudden breach of glacial lakes, are highly destructive, causing loss of life, damage to property, and disruption of water supply systems.

#### **Decline in Freshwater Availability**

The melting of glaciers has a direct impact on freshwater availability in Gilgit-Baltistan. As glaciers shrink, the amount of melt water feeding rivers and streams is gradually decreasing. This decline is particularly worrisome during the summer months when water demand for irrigation is at its peak. The reduced water flow not only threatens agricultural production but also affects drinking water supplies and sanitation systems, creating water stress for local communities.

The water scarcity issue is further exacerbated by population growth and the increased demand for water in downstream areas of Pakistan. As a result, the region's water resources are under immense pressure, leading to conflicts over water allocation and contributing to the vulnerability of agricultural livelihoods.

#### **Impact on Hydropower Generation**

In addition to agriculture, Gilgit-Baltistan's water resources are vital for Pakistan's hydropower generation. Several major dams and hydropower projects depend on a steady flow of water from glacial melt to produce electricity. However, the changing climate and declining water levels are reducing the efficiency of these power plants. As glaciers continue to retreat, the seasonal variation in water availability will likely result in reduced power generation capacity, leading to energy shortages and affecting economic growth in both GB and the rest of Pakistan. The uncertainty surrounding future water supply is a significant challenge for the region's hydropower sector.

### **Impact on Food Security in Gilgit-Baltistan**

#### **Declines in Agricultural Productivity**

The combination of rising temperatures, changing rainfall patterns, and increased frequency of extreme weather events is contributing to a decline in agricultural productivity in Gilgit-Baltistan. With crop yields decreasing and livestock production suffering due to water shortages and heat stress, food availability is under threat. For subsistence farmers in GB, reduced agricultural output means less food for their families and a lower income from selling surplus produce. This decline in food production is directly linked to food insecurity, as households struggle to access sufficient and nutritious food throughout the year.

#### **Vulnerability of Remote Communities**

The remoteness of many communities in Gilgit-Baltistan further exacerbates the region's food security challenges. Limited access to markets and transportation infrastructure makes it difficult for farmers to sell their produce or purchase food during times of shortage. Moreover, the high altitude and harsh terrain limit the types of crops that can be grown, reducing the diversity of food available to local communities.

As climate change continues to affect agricultural productivity, these remote communities are becoming increasingly vulnerable to food shortages, malnutrition, and poverty. In extreme cases, climate-induced migration may occur, as people are forced to leave their homes in search of better living conditions and food security.

### **Adaptation Strategies for Climate-Resilient Agriculture and Water Management**

#### **Climate-Resilient Agricultural Practices**

To address the challenges posed by climate change, farmers in Gilgit-Baltistan need to adopt climate-resilient agricultural practices. This includes the use of drought-resistant crop varieties, improved irrigation techniques, and soil conservation methods to reduce erosion and enhance soil fertility.

The promotion of agroforestry, which involves the integration of trees and shrubs into farming systems, can also help mitigate the impact of climate change by improving water retention, providing shade for crops, and protecting against wind erosion.

### **Strengthening Water Resource Management**

Improved water resource management is critical to ensuring a sustainable supply of water for agriculture, hydropower, and domestic use in Gilgit-Baltistan. This includes the development of efficient irrigation systems that minimize water wastage, such as drip irrigation and rainwater harvesting techniques.

Furthermore, investments in glacier monitoring and early warning systems for GLOFs can help communities better prepare for and respond to extreme weather events. Policymakers must also prioritize the equitable allocation of water resources to ensure that the needs of all communities are met, particularly in times of water scarcity.

### **Enhancing Food Security through Policy Interventions**

To strengthen food security in Gilgit-Baltistan, government agencies and non-governmental organizations (NGOs) must work together to develop policies that support local food production and distribution. This includes providing farmers with access to climate-resilient seeds, promoting sustainable livestock practices, and improving rural infrastructure to facilitate access to markets.

The establishment of food storage facilities and community-based food security initiatives can also help ensure that vulnerable populations have access to sufficient food during periods of scarcity.

Climate change is having a profound impact on agriculture, water resources, and food security in Gilgit-Baltistan, threatening the livelihoods and well-being of its communities. Rising temperatures, erratic rainfall, and the rapid melting of glaciers are leading to water shortages, reduced agricultural productivity, and increased food insecurity.

To mitigate these challenges, it is essential to implement climate-resilient agricultural practices, strengthen water resource management, and develop policies that enhance food security. By adopting these adaptation strategies, the people of Gilgit-Baltistan can improve their resilience to the impacts of climate change and ensure the long-term sustainability of their communities.

### **Socio-Economic Effects of Environmental Changes on Local Communities**

Environmental changes, driven primarily by climate change and human activities, have far-reaching impacts on local communities across the globe. These changes can disrupt ecosystems, alter weather patterns, and influence the availability of natural resources, leading to significant socio-economic consequences. Communities, particularly those in rural and vulnerable areas, are directly affected as their livelihoods, health, and social structures are deeply intertwined with their surrounding environment.

In this essay, we will explore the socio-economic effects of environmental changes on local communities, focusing on key sectors such as agriculture, water resources, health, livelihoods, migration, and social structures

### **Impact on Agriculture and Food Security**

#### **Decreased Crop Yields and Agricultural Productivity**

One of the most significant socio-economic effects of environmental changes is the reduction in agricultural productivity. Changes in temperature, precipitation patterns, and increased frequency of extreme weather events, such as droughts, floods, and storms, disrupt the growing seasons of crops. This results in lower yields and decreased food production, particularly in regions heavily reliant on subsistence farming.

In areas where agriculture forms the backbone of local economies, the decline in crop yields directly affects the income of farmers and agricultural workers. As farming becomes less viable, food insecurity increases, especially for low-income households. The rising cost of food due to scarcity further exacerbates poverty levels, leading to malnutrition and a decline in living standards.

#### **Loss of Livelihoods in Rural Areas**

For communities dependent on farming, livestock rearing, and fishing, environmental degradation poses a direct threat to their livelihoods. Soil degradation, desertification, and the loss of arable land

reduce the ability of these communities to produce enough food. This, in turn, limits their economic opportunities.

Livestock farmers face challenges such as reduced grazing land and water availability, which lower the productivity of their herds. Additionally, changing water temperatures and pollution affect fish populations, threatening the livelihoods of fishing communities. As environmental conditions worsen, many people in rural areas are forced to abandon traditional livelihoods, often moving to urban areas in search of alternative employment, contributing to urban overcrowding and increased socio-economic pressures in cities.

### **Impact on Water Resources**

#### **Water Scarcity and its Economic Implications**

Environmental changes, particularly those associated with climate change, have led to the depletion of freshwater resources in many parts of the world. Glacial melt, reduced rainfall, and over-extraction of groundwater are resulting in water scarcity, affecting both agricultural and domestic water supplies.

In agriculture-dependent communities, water shortages directly impact irrigation systems, reducing crop yields and threatening food security. The competition for water resources between different sectors—agriculture, industry, and households—can lead to conflicts, further destabilizing local economies. Moreover, water scarcity increases the costs associated with accessing water, as communities must invest in new technologies, such as boreholes and water storage systems, to ensure a reliable water supply.

#### **Impact on Health and Sanitation**

Access to clean water is critical for maintaining public health. Environmental changes that reduce water quality or availability can lead to the spread of waterborne diseases, such as cholera, dysentery, and typhoid, as well as exacerbate poor sanitation conditions.

For local communities, the economic costs associated with poor health, such as medical expenses and lost labor productivity can be significant. Additionally, water shortages often force individuals—typically women and children—to travel long distances to fetch water, reducing the time available for education, income-generating activities, and social participation.

#### **Health Impacts and the Burden on Healthcare Systems**

##### **Increased Disease Burden**

Environmental changes contribute to the spread of diseases and increase health risks for local populations. Changes in climate and ecosystem disruption lead to the proliferation of vector-borne diseases such as malaria, dengue fever, and Lyme disease. Rising temperatures provide a more favorable environment for disease vectors, such as mosquitoes, to thrive, expanding the geographic range of these illnesses.

Poor air quality, caused by pollution, deforestation, and the burning of fossil fuels, exacerbates respiratory diseases, such as asthma and bronchitis. The increased frequency of heat waves leads to heat stress, which disproportionately affects vulnerable groups, including the elderly and those with pre-existing conditions. In addition, food shortages and malnutrition caused by declining agricultural productivity weaken immune systems, making people more susceptible to illness.

##### **Strain on Healthcare Infrastructure**

Environmental changes place significant pressure on local healthcare systems, which are often under-resourced in rural and developing regions. Increased demand for healthcare services, combined with the rising cost of medical care, can overwhelm healthcare facilities. This situation leads to higher mortality rates, reduced life expectancy, and lower overall quality of life for affected populations.

In areas affected by extreme weather events such as floods and droughts, healthcare infrastructure may be damaged or become inaccessible, further limiting the ability of communities to respond to health crises. These events also disrupt the delivery of essential medical supplies and services, compounding the socio-economic burden of environmental changes on local communities.

#### **Migration and Displacement**

##### **Environmental Migration**

Environmental degradation, loss of livelihoods, and resource scarcity often force communities to migrate in search of better living conditions. Climate-induced migration, particularly from rural to urban areas, is becoming increasingly common. Communities affected by drought, flooding, and sea-level rise are particularly vulnerable to displacement.

As people leave their homes in search of safer environments and more sustainable livelihoods, this migration puts significant pressure on urban centers, leading to overcrowding, increased competition for jobs, housing shortages, and the strain on social services. These conditions can lead to social unrest, exacerbating existing socio-economic inequalities.

### **Loss of Cultural and Social Identity**

Migration due to environmental changes can lead to the erosion of cultural and social ties within communities. For indigenous groups and other local communities, the environment is deeply linked to their cultural practices, traditions, and way of life. As these communities are forced to move away from their ancestral lands, they risk losing their cultural heritage and social cohesion.

The breakdown of community structures can lead to a loss of social support networks, which are crucial for resilience in the face of adversity. Additionally, displaced populations often face discrimination, marginalization, and challenges in integrating into new environments, which exacerbates socio-economic challenges and undermines their ability to thrive.

### **Changes in Social Structures and Gender Dynamics**

#### **Altered Gender Roles and Responsibilities**

Environmental changes often result in shifts in social structures and gender dynamics within local communities. Women and children, in particular, are disproportionately affected by environmental degradation. In many rural communities, women are responsible for securing water, food, and fuel for their families. As these resources become scarce, women must travel longer distances to collect them, limiting their ability to participate in education, income-generating activities, and community decision-making processes.

Environmental stress also increases the burden of care for women, as they are typically the primary caregivers in households. In times of food and water scarcity, women often sacrifice their own needs to ensure the well-being of their families. This dynamic reinforces existing gender inequalities and limits opportunities for women's empowerment.

#### **Increased Social Conflict and Inequality**

Environmental changes can exacerbate social inequalities, particularly in regions where access to natural resources is already contested. Competition for dwindling resources, such as water and arable land, can lead to conflicts between communities, ethnic groups, or social classes. In some cases, resource-based conflicts escalate into violence, further destabilizing local economies and disrupting livelihoods.

Vulnerable populations, including women, children, the elderly, and the poor, are often disproportionately affected by these conflicts. The unequal distribution of resources and access to economic opportunities widens the gap between rich and poor, increasing social tensions and reducing overall social cohesion within communities.

### **Economic Costs and Loss of Infrastructure**

#### **Damage to Infrastructure from Extreme Weather Events**

Environmental changes, particularly the increased frequency of extreme weather events, cause significant damage to infrastructure. Floods, storms, and rising sea levels can destroy homes, roads, bridges, schools, and healthcare facilities, leading to massive economic losses for local communities.

Rebuilding damaged infrastructure is costly and time-consuming, diverting resources away from other essential services such as education and healthcare. In developing regions, where financial resources are limited, the economic burden of rebuilding after environmental disasters can be overwhelming, delaying recovery and trapping communities in a cycle of poverty.

#### **Impact on Economic Development**

Environmental degradation hinders economic development by reducing productivity in key sectors such as agriculture, tourism, and manufacturing. In regions dependent on natural resources, the depletion of these resources limits economic growth and reduces income-generating opportunities for local populations.

For example, coastal communities that rely on fisheries and tourism are severely affected by rising sea levels, ocean acidification, and the destruction of marine ecosystems. Similarly, regions that depend on agriculture face reduced productivity due to soil degradation and changing climate conditions. These factors contribute to economic stagnation, making it difficult for local communities to improve their living standards and escape poverty.

## **Policy Responses and Adaptation Strategies**

### **Climate-Resilient Development**

To mitigate the socio-economic effects of environmental changes, local communities must adopt climate-resilient development strategies. These strategies include sustainable agricultural practices, efficient water management, and the use of renewable energy sources. Governments and international organizations can support these efforts by providing financial resources, technical expertise, and capacity-building programs for local populations.

### **Strengthening Social Safety Nets**

Social safety nets, such as cash transfers, food aid, and access to healthcare, are essential for protecting vulnerable populations from the adverse effects of environmental changes. Governments must invest in social protection programs to ensure that those most affected by environmental degradation have access to the resources and support they need to adapt and thrive.

### **Conclusion**

This research aims to shed light on the significant challenges faced by the people of Gilgit-Baltistan due to climate change, providing actionable insights for policymakers, development agencies, and local communities to address these challenges and enhance resilience. This structure should give you a comprehensive overview of how to explore the relationship between climate change and the survival of people in Skardu.

### **Recommendations**

The alter of climate change is having serious concern for communities based life in the Skardu .This issue needs urgent and immediate response in order to following the long lasting chronic and irreparable damages facing the people from decades .Policy innervations and seriously legalisations and protocol should be made in order to executed the management mechanism in order by keeping masses awareness, punishment for violators of law relating the environment to be made collaborative coordination between the federal and government of Gigit-Baltistan .

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