"Effects of Climate Change in Baluchistan: Analysing Community Resilience and Government Measures"

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KEY WORDS	ABSTRACT
	Climate change is a major hazard to the ecological and socio-economic environment of the largest yet the most weather-prone province in Pakistan, Baluchistan. The assignment discusses the different impacts that climate change has had on the environment, agriculture, water resources, and the livelihoods of the area. Using the international and national climatic systems as the baseline for the research, the paper shows that Baluchistan is somewhat vulnerable due to frequent droughts, unpredictable precipitation, and infrastructure unavailability. It examines community-based resilience and adaptation strategies and the institutional responses of federal and provincial governments. Even though the Government of Pakistan has formulated policies and action plans on climate change, there are gaps in implementation, coordination issues, and a lack of resources. There is potential in community resiliency programs, but they are small and underfunded. The problems of significant concern are the lack of research, a piecemeal policy, and inefficient early warning systems. The paper concludes with strategic planning to enhance adaptive capacity, such as inclusive planning, integrated water resource management, and climate-resilient infrastructure. The future of Baluchistan remains in danger due to increasing climate threats; as such, a well-coordinated, well-fortified, and science-based response is required.

Introduction

Climate change is becoming one of the most urgent international issues of the 21st century, transforming ecosystems, livelihoods, and global governance models. Its effects span geographical boundaries and impact both developed and developing countries, but their intensity differs and is determined by the social-economic robustness and the capacity of institutions. In developing countries such as Pakistan, the issue is especially critical, as it depends on inflexible infrastructure, structural vulnerabilities, and reliance on climate-dependent industries, including agriculture and water resources.

The country is consistently ranked among the top 10 most affected by climate change, though it contributes less than 1 percent to global greenhouse gas emissions (German watch, 2023). The nation has witnessed drastic changes in temperature, unpredictable precipitation, melting of glaciers in the Himalayas, and an increased frequency of floods, droughts, and heat waves. These variations are not only a threat to food and water security but also to human health, energy production, and economic stability. The 2022 disastrous floods that left more than 33 million homeless are a dark omen of the skewed load of the Pakistani population. Climate change has hence become a multifaceted crisis that threatens human security, interferes with socio-economic development, and requires urgent, evidence-based responses.

Theoretical Framework and Methodology

The present paper is grounded in the Community Resilience Framework, which views resilience as the capability of communities to absorb shocks, adapt to stressors, and transform systems to become sustainable. It is a framework that considers resilience across five interdependent dimensions: social, economic, institutional, infrastructural, and environmental. The vulnerabilities and adaptive strategies of Pakistan in response to the perspective provide a holistic appreciation of the country's vulnerabilities.

The methodology used to conduct the study is a qualitative review and synthesis of secondary data, integrating peer-reviewed articles, government policy documents, reports by agencies such as the IPCC and UNDP, and empirical case studies of Pakistan. The thematic analysis strategy is used to identify recurring patterns, sector vulnerabilities, and measures to address them, and the results are categorized under the broad themes of agriculture, water, energy, and health. This methodology balances theoretical knowledge with empirical data, unlike purely descriptive studies, and provides a critical, organized analysis of climate resilience in Pakistan.

The conceptualization of resilience in the Disaster Resilience Framework (2008) by Cutter considers resilience as a multidimensional concept, that is quantified in five domains: social, economic, institutional, infrastructural, and environmental systems, which are all interrelated. Social resilience can be defined as the education, health, and demographic factors that determine how a community reacts to disasters. Economic resilience concerns the diversity of incomes, the availability of various employment opportunities, and the financial resources available to withstand shocks. Institutional resilience identifies the importance of governance, the effectiveness of policies, and disaster management systems. Endorsing physical assets, transport, housing and utilities, and infrastructural resilience unwinds environmental resilience, which pays attention to ecological sustainability, resource availability, and the ability of

natural systems to rebound. Combining these dimensions, one can emphasize that resilience is not a limited phenomenon confined to disaster response but is incorporated into the entire socio-ecological system of the country.

When applied to Pakistan, the framework provided by Cutter helps determine sectoral and institutional weaknesses. An example of this is evident in the weak infrastructure in flood-prone regions, poorly built health systems, and poorly funded disaster management institutions, which demonstrate lapses in infrastructural and institutional resilience. On the same note, degradation, excessive water exploitation, and rampant urbanization indicate a lack of environmental resilience.

Cutter Disaster Resilience Framework (2008) - the conceptualization of resilience in the social, economic, institutional, infrastructural, and environmental aspects. This framework highlights the multidimensional nature of resilience and the interrelationships among governance capacity, resource availability, and community well-being.

Norris et al.'s Community Resilience Model (2008) – that considers resilience as an adaptive and transformation process, mediated by four main adaptive processes, namely, economic development, social capital, information and communication, and community competence. Collectively, these models can be used to conduct a systematic evaluation of Pakistan weaknesses and adaptive strengths. As an example of the agricultural sector in Pakistan, the Cutter framework can be used to assess environmental and infrastructural resilience, whereas the model by Norris et al. focuses on adaptation at the community level, local knowledge, and participatory governance.

These adaptive capacities are very applicable in the context of Pakistan. Rural agricultural communities facing drought are resilient when their social capital is high enough to share resources and when their thinking is informed by local knowledge to support adaptation. On the other hand, the lack of effective early warning facilities and community competence in areas prone to disasters usually leads to massive human and economic losses in the event of floods or heat waves.

Climate Change – Global and National Overview

The issue of climate change is getting to be viewed as a multidimensional threat to ecological communities, economic performance, human well-being and geopolitical stability. On a global scale, according to the Intergovernmental Panel on Climate Change (IPCC), the past decade was the warmest in history, with atmospheric carbon dioxide concentrations reaching 419 ppm in 2021, a record increase over levels not seen in 800,000 years (IPCC, 2022). This increase in temperature has intensified and increased the frequency of extreme events, including cyclones, droughts, floods, and wildfires. Moreover, climate models estimate that, unless there is a prompt decrease in emissions, average global temperatures will rise by 2 °C or more above pre-industrial levels by the end of the century, dramatically changing hydrological and atmospheric systems (Masson-Delmotte et al., 2021).

South Asia is among the most susceptible regions to climate change because it has a high population density, relies on monsoons, and lacks adaptive infrastructure. South Asia is losing ice cover extremely rapidly in the Hindu Kush-Himalaya region, a vital source of freshwater that poses a threat to the long-term water security of millions (Wester et al., 2019). Pakistan, as part of this region, is experiencing increasing climate variability,

including unpredictable rainfall, prolonged droughts, global warming, and receding glaciers, all of which are putting pressure on natural resources and socio-economic structures.

The Global Climate Risk Index revealed that Pakistan suffered economic losses of more than \$3.8 billion from climate-related disasters during 2000-2019 (Eckstein et al., 2020). These tendencies highlight the country's exposure and limited adaptive capacity, especially in rural areas and among vulnerable populations, such as Baluchistan.

Pakistan has embarked on certain national initiatives to address this crisis. The sectors offered by the National Climate Change Policy (NCCP) include the water, agriculture, and disaster risk reduction sectors, with adaptation and mitigation goals. In addition, the National Adaptation Plan (NAP) is currently being developed with support from the United Nations Framework Convention on Climate Change (UNFCCC). It will aim to incorporate climate resilience into national development planning (Government of Pakistan, 2021). It, however, has implementation loopholes, a lack of funding, and institutional fragmentation, which seem to negate effective climate governance.

Pakistan is a developing country with a small carbon footprint, a vulnerable region, and hence an ideal case for addressing climate justice. Efforts should be made to strengthen the resilience of countries and provinces, particularly in areas such as Baluchistan, to mitigate the risks of long-term climate change and ensure sustainable development.

National and Provincial Climate Frameworks

Pakistan has put in place many policy responses to climate risks, starting with the National Climate Change Policy (NCCP, 2012) and Framework for Implementation (2014-30). Such frameworks are centered on agricultural adaptation, water management, reducing the risk of disasters, renewable energy, and institution building. As per the Paris Agreement and the SDGs, the new NCCP (2021) has supplemented the national priorities with a focus on climate-resilient infrastructure, ecosystem restoration, and low-carbon growth. These measures, however, are successful depending on provincial translation and implementation, as environmental management was also provincialized with the 18th Constitutional Amendment.

In 2017, Punjab became the first province to implement a climate change policy, with its priorities based on agricultural resilience, water conservation, and energy diversification. Projects such as the Billion Tree Afforestation Project (2015-2020) and canal modernization efforts have improved water efficiency. The Agriculture Policy (2018) of Punjab also incorporates climate-smart agriculture, aiming to develop high-yielding, drought-resistant crop varieties.

Then came Sindh with its Climate Change Policy (2019), which focuses on coastal protection, mangrove restoration, and disaster management. This province has over 55,000 hectares of mangroves that it has restored over the years 2015-2021; this is one of the largest mangrove rehabilitation areas in the world. Sindh has more than 350 km of coastline, which is exposed to increased vulnerability from cyclones, floods, and sea-level rise, and its policy clearly focuses on the resilience of coastal communities.

In 2014, Khyber Pakhtunkhwa (KP) introduced the Green Growth Initiative and followed by the Provincial Climate Change Policy (2016) whose major areas of focus were afforestation, renewable energy, and community-based adaptation. The globally known Billion Tree Tsunami (20142018)

planted over 350,000 hectares of woodland, increasing protection of watersheds and carbon sequestration. KP has also increased the number of micro-hydro power stations to encourage low-cost renewable energy in rural areas.

The resource-poor and most ecologically vulnerable province, Baluchistan, adopted its Climate Change Policy in 2017, which was revised in 2020 with the assistance of the UNDP. This policy is significant because Baluchistan is prone to the recurrence of droughts, desertification, water shortages, and unstable livelihoods that rely on rangelands and subsistence farming. Its main pillars include:

- Water resource management by harvesting rainwater, recharging groundwater and irrigation resistant to drought.
- Livestock and agricultural resilience with a focus on climate-sensitive methods, pasture usage, and crop diversification.
- Reducing disaster risks, such as better coordination of the Provincial Disaster Management Authority (PDMA) and early warning.
- Institutional fortification and law, in line with Balochistan Environmental Protection Act (2012).
- Social mobilization and awareness especially focusing on the rural and nomadic communities.

Nevertheless, the implementation of the Balochistan policy faces challenges, including a shortage of funds, poor institutional capacity, and a lack of coordination with federal agencies despite their significance. Climate financing and project implementation in other provinces are lower in Balochistan than in Punjab and Sindh, which receive more fiscal allocations. It, however, is the first provincial policy to explicitly incorporate drought resilience and

rangeland management, both of which are central concerns of its socio-ecological systems.

Generally, the four provinces have formulated climate policies. However, their performance depends on how consistent they are with the NCCP and on whether they are financed, monitored, and supported by the institutions. The case of Balochistan points to the need to use context-specific approaches rather than national template strategies. It is also important to strengthen federal-provincial coordination and climate financing to implement policies into ground-level resilience, especially in the very vulnerable areas.

Environmental Profile of Baluchistan

Baluchistan is the largest in terms of area of Pakistan, covering an area of 347,000 square kilometers or nearly 44% of the landmass of Pakistan but with the least population. It is ecologically distinct and climatically difficult with mountainous topography, arid deserts and expansive plateaus. Large mountain ranges like the Suleiman, Toba Kakari, and Makran serve as topographic barriers and also impede precipitation, contributing to the province's arid nature (Khan and Khan, 2020).

The province has an arid to semi-arid climate, and annual rainfall ranges from 50 to 400 mm, depending on the region. Western and central areas receive very low precipitation, mostly relying on western disturbances during the winter season, while the eastern parts of the country are sometimes helped by the monsoon system (Kazmi et al., 2021). Nonetheless, because of climate variability, rainfall has also become unpredictable and the dry periods followed by extreme wet seasons- usually leading to flash floods because of the lack of vegetation and drainage systems.

Among the most urgent problems in Baluchistan, one may single out water

scarcity. The province depends mainly on underground aquifers, which are being depleted at an unsustainable rate due to over-extraction for agricultural purposes and the absence of recharge processes. The groundwater level in Quetta, the provincial capital, has decreased by over 10 meters over the past 20 years (Ahmad et al., 2020). In most regions, traditional water sources such as karezes, underground waterways constructed centuries earlier, have been depleted, weakening communities and their food security.

The ecosystems in Baluchistan are weak and highly stressed. The habitat is home to a wide range of flora and fauna, with strong presence of highlands such as Ziarat and Hingol National Park. Still, it is often destroyed by overgrazing, deforestation, and land degradation. The forest cover is also estimated to be below 2 percent, and the juniper forests of Ziarat are among the oldest and most endangered ecosystems in the area (Jabeen and Ahmad, 2019).

Another important issue is desertification. The problem of soil erosion, salinity, and loss of vegetation affects almost 70 percent of the province's territory and is aggravated by the unsustainable use of farming and grazing (UNDP Pakistan, 2022). Such environmental degradation not only lowers agricultural output but also exposes the province to climate-related calamities, such as floods and dust storms.

Nonetheless, Baluchistan has significant strategic and resource potential, including mineral deposits, rangelands, and marine habitats along its 770 km-long coastline. Nevertheless, as long as there are no immediate measures to address environmental conservation, climate resilience, and water resource management, the province's socio-economic development remains at high risk due to ongoing ecological decline.

Impacts of Climate Change in Baluchistan

Climate change has one of the worst impacts on Baluchistan in Pakistan due to its arid climate, delicate ecosystem, and reliance on the climate for livelihoods. The effects are felt across sectors such as water, agriculture, health, livestock, and migration, and they pose a significant threat to human security and ecological stability.

Water Scarcity and Droughts

Water shortage is the most obvious effect of climate change in Baluchistan, which is further worsened by frequent droughts. The variability in rainfall has been rising dramatically over the past 20 years, and the frequency of both long dry spells and sudden, intense rainfall is on the rise. The Pakistan Meteorological Department (PMD) reported a decline in average precipitation and a consistent rise in the frequency of droughts, particularly in districts such as Chagai, Nushki, and Kharan (PMD, 2022).

The impacts of these droughts on the groundwater recharge are devastating. In Quetta Valley, they are dropping (almost 2-3 feet per year), and the irrigation systems known as the kareze that served rural populations in high demand are collapsing (GWP, 2021). The decline in water supply has paralyzed agriculture, exacerbated resource wars, and driven rural-urban migration.

Agricultural Vulnerability

Agriculture in Baluchistan is mainly rain-fed and highly susceptible to climatic changes. Increasing temperatures and unpredictable rainfall interfere with sowing and harvesting, especially for large-scale farmers growing wheat, barley, and fruits like apples and grapes. A provincial agricultural risk assessment by FAO (2021) found that during extreme dry periods, agricultural yields in drought-prone districts have also

been reported to decrease by up to 40 per cent.

There is also rising soil salinity and desertification in the province, caused by poor irrigation practices and excessive groundwater use. Farmers usually lack the means and knowledge to implement climate-resilient practices, as there are no extensive irrigation facilities and minimal extension services. Women are also the most affected because they are the key players in subsistence farming, having little land and no access to climate information.

Human Health and Livelihoods

The subsequent changes caused by climate are having a direct impact on the population health. Extended periods of heatwaves have led to increased dehydration and heatstroke cases, as well as the proliferation of vector-borne diseases, such as malaria and dengue, particularly in the low-lying coastal regions of the country, such as Gwadar (WHO Pakistan, 2022). Malnutrition is also caused by food insecurity, which results from reduced agricultural production, especially among children and expectant women in drought-affected areas.

Moreover, natural resource-based livelihoods are becoming unsustainable. Small-scale farmers and herders lose their source of income, which drives them to unsafe urban work or humanitarian aid. Migration of labor has also become one of the survival tactics for many households, leading to family breakups and destabilization of the old community setups.

Livestock Losses

Livestock also plays a major role in rural Balochistan's incomes. But long periods of drought and a reduction in grazing acreage have caused a significant decrease in herd size. A survey by the FAO (2020) indicated that over 50 percent of small ruminant herders in central Baluchistan lost their

animals due to a lack of food and heat stress during the 2018 to 2020 drought season.

The breakdown of animal livelihoods not only impacts income levels but also results in the loss of traditional knowledge, poverty, and nutritional insecurity, as there is less availability of dairy and meat products. The pastoralist nomadic and transhumant communities, who were previously able to endure changes in climatic conditions, are currently among the most susceptible groups in the province.

Environmental Degradation

Climate change enhances prevalent environmental degradation in Baluchistan. The temperature rise and decreased rainfall contribute to further desertification, deforestation, and biodiversity loss. Tree cover, particularly the now-endangered juniper forests of Ziarat, has declined due to illegal logging, overgrazing, and climate-related stress (WWF Pakistan, 2021).

Flash floods and the absence of vegetation cover increase soil erosion, making large areas of land unproductive. These transformations over time lead to declines in the capacity of land to sustain life and in the ecological processes, including carbon sequestration and groundwater recharge, that rural livelihoods rely on.

Internal Displacement and Migration

The cumulative effects of water shortages, failed farmlands, and the collapse of livelihoods are driving internal displacement. Whole populations in dry regions like Washuk, Chagai, and Kharan have moved to cities such as Quetta and Turbat to find water, jobs, and social services (IOM Pakistan, 2022).

This migration, due to climate change, strains available urban infrastructure, which is already overstrained, and creates social tensions. There are undesired settlements, health hazards, and employment opportunities in the places of destination,

which contribute to the vulnerability of the displaced population. Without climate migration policies at provincial or national levels, such issues are not addressed in many formal planning frameworks.

Community Resilience and Adaptation Strategies

Although Baluchistan is currently highly vulnerable to climatic change, local populations in the province have demonstrated their capacity to withstand over time through the application of indigenous knowledge systems, social cohesion, and adaptation practices. Such community-based plans, which are usually not well considered during formal planning, are, however, very important in reducing the region's vulnerability to climate shocks. Whether it is in conserving water, adopting different agricultural practices, or promoting tribal forms of governance or women's participation, the grassroots response can be a good example of how to adapt sustainably.

Indigenous Knowledge and Local Practices

In Baluchistan, climate adaptation is based on indigenous knowledge. People have traditionally used wind patterns, animal behavior, and soil color to forecast rain or a temperature change. These non-instrumental forecasting techniques have helped subsistence farmers make rational decisions regarding crop planting and harvesting (Ali & Nasir, 2020). For example, the centuries of trial-and-error adaptation to extreme weather conditions can be traced in the traditional use of local drought-resistant crops, including millet and barley.

Likewise, the architecture of mud houses, which isolate heat in the summer and cold in the winter, is an example of a sustainable adaptation practice in rural life. But contemporary developmental endeavors usually fail to consider such knowledge systems, and there is a danger of eroding them.

Community-Based Water Conservation Methods

Traditional water conservation methods have resurfaced due to water scarcity, and innovative methods have been developed. The ancient system of underground canals, karez, used for the transport of water, although in decline, still serves some communities. Local initiatives have arisen over the last few years to restore these systems by recharging groundwater and making them more water efficient with community labor and NGOs (Ahmad and Baloch, 2021).

Simple rainwater and check dams, as well as small-scale reservoirs, are becoming increasingly common in places like Pishin and Ziarat, many of which were built by communities. These steps have improved irrigation, minimized the impacts of floods, and ensured a strong water supply even in dry seasons. Notably, collective village decision-making tends to implement and sustain them, which is indicative of social capital.

Agricultural Adaptations

With climate unpredictability, farmers are moving to climate-tolerant crops and new practices. Short-cycle agriculture, the application of drip irrigation infrastructure, and mixed cultivation have been found promising in districts such as Mastung and Loralai (Bashir et al., 2022). Agroforestry and compost-based soil enhancement techniques are also being used by local farmers, with the assistance of NGOs, to sustain soil moisture and fertility.

In addition, some mobile-based weather advisory services are being tested in parts of the country to help farmers prepare for extreme weather events. The capacity of farmers to adapt would be enhanced by expanding these services.

Role of Tribal Systems and Elders

Tribal elders (sardars) and traditional councils (jirgas) are still at the centre of the decision-making process in most of rural Baluchistan. Although based on customary law, these systems tend to be stabilizing when there is environmental stress. For example, older adults facilitate water-sharing between villages, resolve grazing land conflicts, and organize efforts to restore karez systems or to preserve forests (Raisani & Khan, 2021).

Whereas traditional governance formations have occasionally been seen as exclusionary, especially toward women and lower classes, they still provide a platform for grassroots climate governance. The governance gap between the state and the community can be addressed by integrating tribal systems into formal adaptation planning through sensitization and capacity-building.

Women's Role in Adaptation

The women of Baluchistan are disproportionately affected by climate change, especially in food production, water collection, and household health. They are however, agents of adaptation. Male domestic knowledge regarding seed saving, household gardens, and livestock care plays a major role in the resiliency of households (Gul & Yasmin, 2020).

Women-headed community-based organizations (CBOs) are also increasingly emerging in places such as Khuzdar and Turbat. Micro-irrigation, water storage, and health education projects are among these groups, and NGOs frequently fund them. Nevertheless, women are still restricted from full participation in climate resilience efforts by structural barriers stemming from the absence of land rights, mobility, and access to information. It is therefore important to promote gender inclusive adaptation planning.

NGO and Community-Led Programs

Non-governmental organizations are also instrumental in community resiliency in Baluchistan. Organizations such as BRSP (Baluchistan Rural Support Programme) and HANDS, as well as international donors such as UNDP, have launched programs in climate-smart agriculture, community-based disaster risk reduction (CBDRR), and forest restoration. Such initiatives are usually focused on awareness creation, early warning mechanisms, and village-level infrastructure support (UNDP Pakistan, 2022).

An example of success stories is the Community Resilience Project in District Kech, where communities in the area developed hazard maps, planted drought-resistant trees, and engineered rainwater-harvesting projects. Top-down government projects have a lower success rate than locally owned, context-sensitive interventions.

But the replication and the long-term viability of NGO actions, however, frequently rely on further donor aid. Increased collaboration among NGOs, local governments, and academic institutions can create long-term resilience planning and knowledge sharing.

Government Policies and Institutional Responses

The Pakistan Government has implemented various policies and instituted policies at the national level to mitigate climate change, with much emphasis on resilience, adaptation, and disaster risk mitigation. Although this has been done, weaknesses in execution, disjointed coordination, and a lack of resources still hamper effectiveness, particularly in vulnerable provinces such as Balochistan.

Role of NDMA and Federal Institutions

The National Disaster Management Authority (NDMA) is central to the

coordination of disaster risk reduction, preparedness, and response in Pakistan. It also offers technical skills, coordination at the national level, and policy guidance to provincial authorities. In the event of a major disaster, NDMA activates federal resources and foreign aid, as in the 2022 floods that devastated more than 8 million individuals and caused losses of an estimated US $30 billion (World Bank, 2023). Nevertheless, assessments highlighted the lack of preparedness, the slowness of relief distributions, and the insufficient incorporation of local institutions (Ahmed and Akhtar, 2023).

At the federal level, the Ministry of Climate Change and Environmental Coordination (MoCCEC) is responsible for climate policy, which designs and implements the National Climate Change Policy (2012, revised 2021). The new NCCP puts Pakistan on a track towards the Paris Agreement and the SDGs, introducing plans for climate-resilient infrastructure, the growth of renewable energy, sustainable agriculture, and the restoration of ecosystems.

National Climate Frameworks and Adaptation Plans

The Roadmap Framework for the Implementation of NCCP (2014-30) provided an implementation roadmap, and the National Adaptation Plan (NAP, 2023) also enumerated adaptation priorities across sectors, such as water, agriculture, health, and energy. These structures recognize Balochistan as one of the climate-sensitive provinces due to drought, desertification, and rain-fed and livestock-based agriculture. Moreover, the Alternative and Renewable Energy Policy (2019) stipulated that 30% of the electricity should be produced by renewable sources by 2030, which is essential to curb the emissions and energy insecurity. Such large-scale programs as the Ten Billion Tree Tsunami Program (2019-

2023) and Recharge Pakistan Project (aiming at floodwater management and aquifer recharge) show that the federal government is committed to restoring the ecosystem and adapting to climate change.

Internationally Supported Projects

Pakistan has also collaborated with global bodies to become more resilient. In the Glacial Lake Outburst Floods (GLOF-II) projects, sponsored by the Green Climate Fund and the UNDP, early warning systems and watershed management measures were established in the north of Pakistan and are applicable to the rest of the drought-prone provinces, such as Balochistan. Likewise, post-flood reconstruction in the Pakistan Resilient Recovery, Rehabilitation, and Reconstruction Framework is being steered by World Bank-backed projects on the same with an emphasis on climate-resilient infrastructure.

Institutional Challenges and Gaps

Although progressive models are in place, implementation is still undermined by financial limitations, a lack of technical skills, and poor coordination between agencies. Budgetary allocations for climate are usually inadequate, and budget planning is not incorporated into development plans. Moreover, there is limited local data on such provinces as Balochistan, compromising the quality of the vulnerability assessment and adaptive planning (Kakar et al., 2022). Instability in the political system and a high rate of transition and change of leadership also hinder continuity and accountability in the policies (Shah & Iqbal, 2021).

Pakistan has already developed a well-built climate policy framework, such as the national policy, adaptation frameworks, and significant resilience efforts. However, institutional frailty and lack of resources limit the translating of these policies into productive results especially in unsound provinces like Balochistan. The next vital

steps in reducing policy-practice dysconnectivity between NDMA and provincial authorities are the enhancement of its integration with provincial governments, uniform funding, and the incorporation of localized data in planning.

Key Challenges and Gaps

Although there has been a growing awareness of climate change as a threat, Baluchistan is still struggling with numerous issues that interfere with sound mitigation and adaptation measures. Institutional and governance weaknesses are one of the greatest obstacles. The disjointed cooperation between provincial and federal authorities, absence of a consistent climate adaptation framework in the provincial spheres, the absence of devolution of authorities to local authorities are administrative bottlenecks. Not all local institutions are technically competent, climate literate, and have the resources to incorporate the aspect of climate into their planning activities (Ali and Rehman, 2022).

An ongoing inadequacy of climate related data and other researches further hinders evidence based decision-making. Baluchistan has poor meteorological and hydrological monitoring facilities. Consequently, early warning mechanisms and climate forecasting are still not reliable, which exposes communities to severe occurrences (Ahmed, 2021). Lack of region-specific vulnerability assessment as well as socio-economic profiling also restrict the use of effective policies tailoring.

Another significant challenge is financial constraints. The climate adjustment initiatives in Baluchistan are grossly under funded, both in the planning and implementation process. Although, international donors and schemes such as UNDP have launched pilot projects, lack of financial pipelines to expand the projects across the province are evident. Climate change has a low provincial Public Sector Development Programme (PSDP) budget allocation, and accessibility to the international climate finance mechanisms are underutilized because of bureaucratic constraints (Kakar et al., 2023).

In addition, the response mechanisms and disaster preparedness are poor. Despite the fact that the Provincial Disaster Management Authority (PDMA) is tasked to spearhead the disaster risk reduction (DRR) efforts, it is commonly bureaucratic through its responsiveness instead of proactivity. This became obvious in the latest floods when the response time was delayed, and the infrastructure did not provide sufficient relief (Baluchistan Disaster Management Report, 2022).

Finally, the sociopolitical instability is another complication. Continuous security problems, inter-tribal violence and political exclusion in certain districts do not allow a steady outreach and data gathering and infrastructure building. These obstacles do not just make it difficult to intervene by the government, NGOs, or community-based organizations which are essential in climate resilience (Siddiqui and Jan, 2020).

To deal with these inter-relational issues, it is necessary to transform the institutional structures systemically, increase cooperation in research, financial devotion, and community involvement.

Opportunities and Recommendations

Although the problem of climate change in Baluchistan is rather serious, there are some opportunities to enhance the resilience and adaptive capacity in the province. By exploiting such opportunities via an inclusive and focused approach, weak points can be turned into sources of sustainable development.

The integration of climate adaptation in provincial development planning is a very critical opportunity. Proactive and coordinated activities in Baluchistan may be enhanced by the incorporation of the climate resilience in sectoral policies which involves agriculture and water management, health and disaster risk reduction. The creation of the specialized Climate Change Cell in the Planning and Development Department may assist in aligning the provincial policies to the National Climate Change Policy and National Adaptation Plan.

Another big opportunity lies in the opportunity of investment in climate-smart agriculture. Drip irrigation, drought resistant crop varieties and agro forestry techniques can be used in order to improve food security and livelihood in rural areas. Community-based natural resource management would also be a way of ensuring that rangelands, water bodies and forest resources are used sustainably particularly in ecologically sensitive locations such as Zhob, Awaran and Chagai. There must be capacity building at the local level. Readiness to adapt to climate, early warning mechanisms, and green entrepreneurship of government officials, communities, and youth can support locally based solutions. Non-governmental organizations and academic institutions can be critical to such trainings and creation of climate awareness at the grassroots (Rehman and Shah, 2022).

Financially, Baluchistan needs to be aggressive in accessing international climate financing schemes like the Green Climate Fund (GCF) and Adaptation Fund via project proposals that are jointly prepared with the UN agencies, donors and ministries in the respective countries. There is also untapped potential in the sustainable investment and creation of jobs in the areas of public-private partnerships in renewable energy, climate-resilient infrastructure, and eco-tourism.

The increase in climate research and data gathering is another important issue. Enhancement of the partnerships between provincial universities, research institutions, and the Pakistan Meteorological Department can contribute to the climate modelling and the augmentation of risk assessments. Weather applications on mobile phones and networks of community-based observations can be considered as cheap, yet highly effective, instruments to make vulnerable populations more empowered with real-time information.

Lastly, adaptation strategies will be socially just and sustainable, through the provision of inclusive governance systems, which will bring women, minorities, and marginal groups into the climate decision-making process. Baluchistan can no longer be climate vulnerable but climate resilient and long-term sustainable by pursuing a multi-sectoral and inclusive strategy.

Conclusion

Climate change poses a complex risk to Baluchistan province and exacerbates its existing vulnerabilities, given its hostile geography, socio-economic instability, and infrastructural constraints. The analysis of Baluchistan's environmental profile and climate threats has revealed that the region should be given its own set of interventions. The resulting effects have included droughts and water shortages, agricultural collapse, and displacement, highlighting the province's low adaptive capacity. Although there are national climate frameworks and localized efforts, weaknesses in institutional coordination, policy implementation, and access to climate finance persist.

However, there are viable prospects. The process of sustainable adaptation can be encouraged through the development of community resilience, adopting climate-

smart agriculture, incorporating indigenous knowledge, and obtaining specialized governmental investments. In order to pursue these goals, stakeholders should focus on priorities such as inclusive planning, strengthening provincial climate governance, and building multi-sector relationships. Strategic investments in research, early warning systems, and capacity-building programs can enable local communities to address the changing realities of climate change.

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