IMPACT OF CLIMATE CHANGE ON BALOCHISTAN, PAKISTAN

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Abstract

Balochistan is territorially Pakistan's largest province, covering 43 % of its landmass with only around 6 % of the population. Climate Change has impacted Balochistan's population in multiple ways. The 2022 floods disconnected the whole province from the rest of Pakistan. Roads, railways, and the rest of the infrastructure, including dams, suffered severe damage. The arid environment and the scarce and sporadic population made it difficult for the authorities to provide basic facilities to the population. Climate Change, including shifts in seasonal weather patterns, escalating temperatures, erratic monsoon variations, and the melting of northern glaciers, has made the livelihood of the people of Balochistan difficult. Although Pakistan's contribution to carbon emissions is nearly 0.9%, it still comes in one of the most vulnerable countries affected by climate change. It is essential to consider that Balochistan already suffers from discontent because of the negligence of government and state institutions, precarious law and order situation, separatist tendencies backed by foreign actors because of Balochistan's strategic significance, and Gwadar's critical role and potential in the China-Pakistan Economic Corridor (CPEC). The impact of climate change may aggravate the tensions because people are forced to flee their homes and seek refuge in more habitable areas, which could lead to potential conflicts over resources. This study employs a qualitative methodology, utilizing academic literature, grey literature, and primary data collected through interviews with officials from the Department of Disaster Management Authorities and residents and volunteers. It highlights how climate change has exacerbated the drying up of water reservoirs and the destruction of crops, thus causing migration to urban centres over food insecurity, and a lack of infrastructure and civic amenities. The paper also recommends ways to overcome these impediments and convert the negative implications of climate change into positive outcomes by adopting a people-centric and proactive disaster management approach.

Keywords: Climate Change, Balochistan, Pakistan, Food Insecurity, Migration

Introduction

Climate change has multiple adverse impacts on the globe. It affects the overall ecosystem, thus impacting human beings and different species of plants and animals. Natural resources, such as water and food, are being depleted in several parts of the world. Possible clashes and conflicts can emerge because of resource depletion. The negative impacts of climate change are felt mainly by third-world countries, with negligible carbon emissions. Millions of people were displaced in countries such as El Salvador, Honduras, Guatemala, Bangladesh, Syria, Sudan, Nigeria, Niger, and Mali. Many countries, such as Somalia, the Philippines, Niger, and Colombia, face internal conflicts due to displacement

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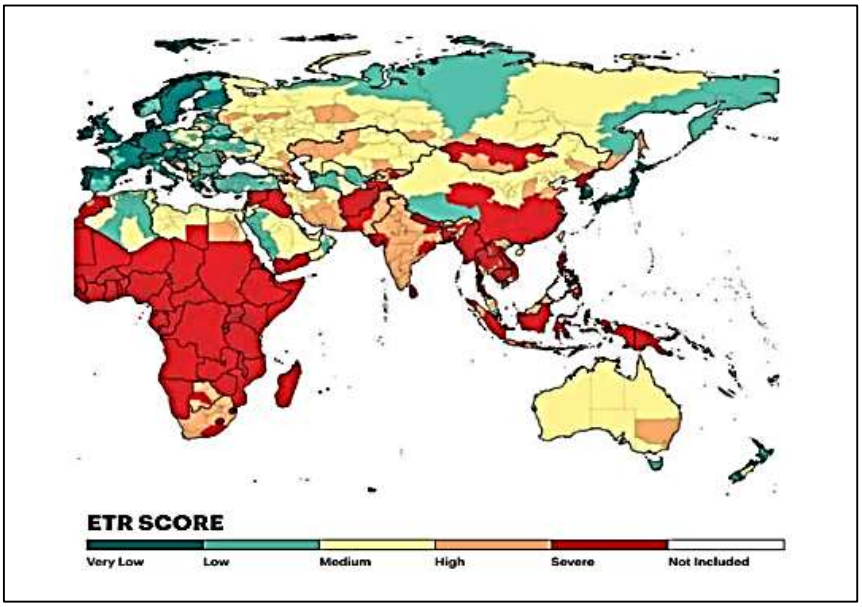
and climate migration.[1] If the issue of climate change is ignored, the situation will only worsen with each passing day.



To grasp how climate change affects the economies and societies of poor countries, it is necessary to follow the chain reaction of the problems it creates. This procedure emphasizes three crucial risk factors: economic fragility, insufficient food availability, and extensive migration patterns.[2] The third world faces economic downfall, food scarcity, and substandard health and education facilities. In 46 countries where about 2.7 billion people live, climate change with social, economic, and political issues is expected to increase the risk of violent conflicts significantly.[3] The Environmental Threat Register (ETR)[4] is a tool that assesses and documents potential environmental risks and opportunities associated with a project or activity, helping organizations identify and manage those risks. It concentrates on four threat categories linked to conflict drivers. These threats are categorized by severity, ranging from very low to high. A country is severely threatened if it surpasses one or more of the four thresholds, including food insecurity, natural disasters, demographic pressures, and water risk.

Climate change is worsening the circumstances in climate change-vulnerable states, and Pakistan is among the most vulnerable. As the German Climate Risk Index indicates, Pakistan presently holds fifth position among the world's most climate-vulnerable nations.[5] In recent years, Pakistan has been struggling with the repercussions of climate change, including shifts in seasonal weather patterns, escalating temperatures, erratic monsoon variations, and the melting of northern glaciers.

Despite contributing only 0.9% to the global carbon emissions, Pakistan remains among the most climate-vulnerable nations. Major polluting nations should assist Pakistan in mitigating climate change, as the country disproportionately suffers from greenhouse gas emissions generated by industrialized states.

Climate change severely impacts the world through droughts, floods, heat waves, etc. Burning fossil fuels in industries, cars, and houses releases Carbon dioxide (CO_2). The beef and dairy cattle sector significantly contributes to global greenhouse gas emissions, with methane constituting approximately half of the total emissions from this industry. Cows produce methane primarily through two processes: their digestion and their waste.[6] These gases are released into the atmosphere, and when sunlight reaches the Earth's surface, these gases trap the sunlight, and the world becomes warmer. Deforestation and the greenhouse effect also contribute to this process called global warming. Because of global warming, glaciers melt, and the rising sea level becomes a source of floods, while the moisture of the Earth also dries up, resulting in droughts. Climate change has a long-lasting effect on global warming and the Earth's atmosphere, caused by human activities.[7]

In the case of Balochistan, the map shows that even in Pakistan, it is the most vulnerable area to climate change, meeting all the conflict-driven thresholds whether it is water scarcity, natural disasters in the shape of droughts or floods, demographic changes in the shape of migration from rural to urban, and food insecurity. Balochistan is the least developed region of Pakistan and South Asia. It is also a water-scarce region. The effects of global warming have aggravated the situation, and more than 85% of the people in the province are deprived of clean drinking water.[8] The agricultural sector has suffered from severe, repeated droughts, rising temperatures, and unprecedented rainfall. Rising temperatures increase the dryness and evaporation of water, worsening moisture loss.[9] These changes in rainfall patterns can affect water availability for agriculture, livestock, and human consumption. As a result, water scarcity can give rise to food insecurity, which can create tensions and disputes among communities and sectors competing for water and food resources. According to Pakistan's National Nutrition Survey, 48.6% of Balochistan's population suffers from malnutrition, higher than the country's average of 40 per cent.[10] Climate change impacts, such as higher temperatures and prolonged droughts, can contribute to population displacement and migration. Almost 116,000 people are registered as displaced due to the 2022 floods in Balochistan.[11] People are forced to flee from their homes and seek refuge in more habitable areas, which could lead to potential conflicts over resources and competition for jobs, and create tense environments in the social and economic systems of the host communities.

During the interviews, most of the people of Balochistan came out unaware of climate change and its impact on their lives. To begin with, they were unaware of the meaning of climate change and why and how it is taking place. They think of it as a divine punishment from God. Their belief system does not allow them to think outside the narrative that their older generations and society have built. Another common misunderstanding among the people of Balochistan was the belief that climate change is the impact of solar panels that get energy from the Sun. As per this opinion, solar panels trap the sun's rays, warming the Earth. One can gauge and analyze the lack of awareness and knowledge among the people living in Balochistan, who, instead of installing more solar panels to minimize the impacts of climate change, are uninstalling them by saying that the temperature is increasing owing to these solar panels. There is a need to educate the people of Balochistan about climate change.

Climate change has profound implications; however, proper planning, robust infrastructure, and proactive management can convert its negative impacts into positive outcomes, specifically in the water-scarce areas of Balochistan. Excess water during torrential rains can be stored for future use and be full of fresh soil and minerals for better agriculture.

Both primary and secondary sources of data collection and analyses have been used. The researchers have conducted an extensive desk and literature review for this paper in which the relevant research papers, opinion pieces, published and unpublished dissertations and books were consulted. The literature review helped the researchers identify the gaps in the literature, whereas the desk review helped make a semi-structured interview guide for the qualitative interviews. The literature review revealed a lack of available data and literature about the impacts of climate change in Balochistan, which also became a limitation of the study and was addressed by conducting interviews. The data collected by primary sources indicated that the negative implications of climate change could raise tensions among different ethnic communities in Balochistan over the limited resources.

Open-ended interviews with an interview guide (for the researcher) were conducted with people in the field of disaster management and with ordinary people across Balochistan (from cities in the south, north, and the capital city of Quetta) to assess their understanding of climate change and its overall implications. After the interviews, they were transcribed and sorted into different themes using the coding system, which helped the researchers analyze the qualitative data generated through these interviews. The main reason behind qualitative analyses was to get the in-depth insight of the officials of the relevant departments, as well as the public, about the impacts of climate change.

The main themes that originated after this process were understanding of climate change amongst the local people, understanding amongst the practitioners in the field of disaster management, the implications of climate change on the livelihood of people and how the impacts of climate change can be exploited positively. These interviews were conducted over Zoom, telephone and in person (mainly in Quetta).

All the interviewees were given a consent form as well were provided with the ethical guidelines that were being followed during the research study. After receiving the signed copies of the consent forms, the researchers went ahead and conducted the interviews. The interviews were recorded after taking consent from the subjects.

Historical Background of Floods in Pakistan

The Federal Flood Commission reports that Pakistan has witnessed 28 super riverine floods over 75 years. These floods refer to exceptionally severe and widespread flooding caused by overflowing rivers, often resulting from prolonged, intense rainfall or the convergence of multiple river systems, leading to extensive inundation of surrounding areas. The super floods began in 1950 and continued with occurrences in 1955, 1956, 1957, 1959, 1973, 1975, 1976, 1977, 1978, 1981, 1983, 1984, 1988, 1992, 1994, and 1995.[12] Notably, every year from 2010 onward, Pakistan has witnessed these catastrophic events, including the most severe flood in the nation's history in 2010 and 2022. The floods collectively impacted a vast expanse of 2 million acres of crops, and nearly 794,000 livestock were killed. It damaged infrastructure and houses, leaving millions of people at risk of malnourishment and waterborne diseases. Around 33 million individuals were affected by the floods, resulting in the unfortunate loss of over 1,700 lives and the damage or destruction of up to 2.2 million homes.[13]

Repeated extreme weather events and natural disasters have further exacerbated these challenges.[14] The recent floods of 2022 have damaged infrastructure, livestock, and agriculture, particularly in the Sindh and Balochistan provinces.[15] As of December 30, 2022, based on the analyses conducted by the Integrated Food Security Phase Classification (IPC), the regions of Balochistan, Khyber Pakhtunkhwa, and Sindh in Pakistan are known for historically experiencing high levels of food insecurity, malnutrition, and poverty.[16] The situation has worsened due to climate change.

Mismanagement of Water Resources

Although climate change contributes to overcoming drought and food insecurity, Pakistan's mismanagement of its natural resources, particularly freshwater sources, has shown neglect of their security and management.

The country's rivers suffer from significant pollution, and its aquifers face severe strain due to unchecked and irresponsible groundwater usage for irrigation.[17] Pakistan holds the 14th position among the 17 countries facing an "extremely high-water risk" globally, with approximately one-third of its available water being wasted.[18]

In Pakistan, the issue of water wastage persists. People in certain regions with sufficient water often waste it, while in many other areas, there is a dire water shortage for basic needs, such as drinking. Pakistan's outdated irrigation system wastes 61% of water during transport and application. Pakistan stores only 9% of the available water in the Indus River System.

Table 1: Distribution of Canal Water among Provinces is governed by the 1991 Water Accord in Billion Cubic Feet (BCF)

Sr. No.	Province	Allocated Water (BCF)	Percentage of Total Share
1.	Punjab	144.8	48 %
2.	Sindh	126.7	42 %
3.	Khyber Pakhtunkhwa (former N.W.F.P.)	21.2	7 %
4.	Balochistan	9.05	3%

The distribution of canal water among provinces is governed by the 1991 Water Accord, where a starting volume of 144.8 billion cubic feet (BCF) of water is allocated, with approximately 48% allocated to Punjab, around 42% to Sindh, 7% to Khyber Pakhtunkhwa, and about 3% to Balochistan.[19] The 1991 Water Accord lacks provisions for sharing water shortages. This has led to disputes between Punjab and Sindh and between Sindh and Balochistan. Sindh accuses Punjab of water theft, while Balochistan claims Sindh is not providing its due share from the Guddu and Sukkur Barrages, resulting in ongoing skirmishes. Pakistan has adopted many policies to use water sustainably, such as the Punjab Water Act, the Sindh Agriculture Policy, and the Balochistan Integrated Resource Management Policy.[20] Nonetheless, these policies exhibit certain deficiencies, including a lack of a scientific foundation, water quality concerns, a lack of defined targets, monitoring and evaluation, and failure to reach targeted SDGs. It is necessary to amend such policies to make them practical.

Lack of Dams

One of the reasons for excessive floods is the lack of dams. Pakistan has a total of 150 large and small dams.[21] However, these dams cannot control the water during excessive floods. According to a BBC documentary on the 2022 floods, many dams could not stop the excessive water and were breached because of their limited capacity. Due to the lack of dams in the Koh-e-Suleiman range of Balochistan, floodwater entered residential areas.[22] There is a need for good-quality small dams in every province. It will stop the excessive water flow and store water for future use.

Absence of Regulation for Equitable Use of Water

Underground water or water channels are used for irrigation in Pakistan, specifically for sugarcane, rice, and wheat crops.[23] In Balochistan, agriculture and livestock are the primary sources of income despite being barren land. The source of irrigation for crops is groundwater and aquifers because there is no major river or canal system except the Kachhi Canal, which is situated northwest of the province.[24] In Balochistan, ineffective policies and governance structures have exacerbated the decline in groundwater levels. Unregulated installation and subsidies on agricultural tube wells have significantly aggravated this issue.[25] Using groundwater for irrigation has reduced the water level, which has motivated the rural community to migrate to urban areas. The population increase in urban centers further increases the burden on available water resources in urban areas.

Incomplete Projects Due to Corruption

Balochistan is facing a water scarcity issue. Although a comprehensive programme was initiated in 2009 to construct 100 small dams, progress has been slow. Among the planned dams, Winder Dam, Hingol Dam, Pelar Dam, Garuk Dam, and Naulong Dam have all faced significant delays and cost overruns. Besides this, there is a long list of incomplete projects in Balochistan, including Bostan Dam in Pishin, Barak Dam in Quetta, Uthandaro Dam in Lasbela, Sasool Dam in Khuzdar, Sur-e-Aab Dam in Panjgur, Jodair Dam in Awaran, Taigh Dam in Khuzdar, Chapchal Dam in Kalat, Kashi Dam in Khuzdar, Makola Dam in Gwadar, Darwar Dam in Kech, and Miskin Dam in Gwadar.[26] These dams, spread across various districts, built in 2018, would have saved a considerable volume of water and turned around the economy and agricultural development in the region, besides addressing the issue of water scarcity and flooding and ensuring sustainable development.

According to a recent audit report, only 26 out of 100 dams were completed in 2021 rather than in 2018. This report also revealed financial irregularities of Rs. 2.4 billion. Such corrupt practices are reasons for delays in the construction of dams and, thereby, the destruction caused by torrential rains, which damage lives, livestock, and crops.

Impact of Climate Change on the Livelihood of People of Balochistan

Climate change, migration, and conflicts are causally related significantly. The increase in population and depletion or destruction of resources are catalysts for displacement and conflict. Climate change has been connected to resource depletion and conflicts in countries such as Myanmar, Syria, and Iraq. Conflicts in African nations such as Sudan, Nigeria, the Republic of Congo, Libya, and Ethiopia have been associated with population displacement.[27] According to the International Disaster Database, Pakistan faces high risks of losses from natural disasters, especially floods.[28] The country has a significant risk value regarding conflicts and human vulnerability to climate-related dangers.[29] The scarcity of water[30] and food shortage could increase the risk of conflict among different communities living in Balochistan, which is already a conflict-ridden province of Pakistan. Excessive water during floods can also escalate conflicts. During an interview conducted with a volunteer who has worked in climate-affected areas of Balochistan, he mentioned that "conflicts are arising in the regions where rivers (or other water bodies) are present. The landlords and influential people are making small dams on the rivers, channelizing the water and diverting the direction of river water towards their fields". Another resident from the Muslim Bagh area in Balochistan said that "people in Muslim Bagh are fighting over the fertile lands due to the surplus water from floods of 2022." This competition for fertile agricultural areas often leads to tension and conflicts among local communities. The primary data thus revealed that the conflicts are emerging because of water scarcity (leading to migration, etc.) and excessive water in areas where it could be used for irrigation, such as areas near the Nasirabad division.

Table - 2: Key Climate Change Challenges in Balochistan

Sr	Climate Challenge	Impact
1.	Water Scarcity	Depletion of ground water levels, droughts
2.	Migration	Burden on resources of other provinces
3.	Food Insecurity	Malnutrition
4.	Temperature Rise	Floods and heatwaves
5.	Extreme Weather Events	Famines, droughts, floods

Water Scarcity

Balochistan is already struggling with water scarcity. This region has experienced numerous periods of drought, from 1967–1969, 1971, 1973 to 1975, 1994, and 1998 to 2002. These severe drought periods profoundly impacted livelihoods and the local economy, devastating nearly 80% of fruit orchards.[31] Regular droughts and excessive water use have caused the underground water level to drop. The focal person of the Provincial Disaster Management Authority (PDMA) Balochistan emphasized that "conflicts tend to arise in areas grappling with water scarcity. Conflicts are most likely to emerge in the regions with water deficiency because people might fight over the available water, which would be less in quantity". He also said conflicts are inevitable in regions with excessive water, for people would fight over fertile lands.[32]

Gwadar is the port city of Balochistan, and its people are facing an acute water shortage. In October 2023, skirmishes between the state officials and the locals broke out. The locals claimed that stopping the water supply to Gwadar town is quite unusual, especially when all dams and reservoirs are filled with water.[33] However, if dams and reservoirs were filled, the question is why water was not supplied to the local community. The concern revolves around the perceived equitable distribution, potentially leading to conflicts. Such evidence leads us to the possibility of emerging conflicts in the province between the local Baloch and the government authorities. It will further increase the intensity of the present ethnic conflict in Balochistan. There is a need for acknowledgement and practical solutions to these issues, which would not be possible without taking the locals and experts on board.

Quetta Becoming a Dying City Because of Water Deficiency

Quetta, the provincial capital, is the sole prominent urban center in the region. Colonial British officials initially planned it for a population of 50,000, which now accommodates an estimated 2.5 million residents, highlighting the area's acute water scarcity.[34] The settlement of millions of Afghan refugees has also strained the water resources of Balochistan.[35] Quetta plays a vital role in fostering economic growth and job opportunities at the provincial level. If Quetta runs out of water and starts to dry up, it will not just impact the people living there, but 20% of the province's population might have to move to other provinces because of the water shortage. Significant population migration will likely result in considerable demographic, social, and political challenges and conflicts in Sindh or Punjab.

However, the population density in these provinces is already high, and migration to these provinces could lead to disputes within these provinces. According to the Pakistan Population Census 2023, the highest population growth was registered in Punjab, totaling 17.7 million, with a population density of 622/km2 (1,610/sq mi), followed by Sindh with 7.8 million and a population density of 395/km² (1,020/sq mi).[36]

A significant population surge, excessive groundwater exploitation, and a prolonged drought have collectively propelled Balochistan into a water crisis.[37] Ten years ago, water was accessible at a depth of 30 meters below the surface. Presently, it has become challenging to locate water above 100 meters. A report from the early 1990s projected a scary future for Quetta, predicting that within two decades, the city would become uninhabitable and dead due to the unavailability of water.[38]

Food Insecurity

Food insecurity means no regular access to safe, plentiful, and nutritious food to live an active and healthy life for a person or a community.[39] Not only water, but Pakistan waste 19.6 million tons of food worth US$4 billion annually. It makes up 26% of its total food production.[40] This contributes to food shortages in the country. Despite being an agricultural country, the people of Pakistan are facing food insecurity because of the recent floods and food waste. In the 2022 floods, almost 12 districts of Balochistan, Gwadar, Chaghi, Harnai, Kharan, Kech, Qilla Abdullah, Loralai, Naushki, Pishin, Panjgur, Zhob, and Washuk, faced food shortages. According to the National Nutrition Survey of Pakistan, 48.6% of Balochistan's population faces malnutrition, surpassing the national average of 40%. The people in Balochistan suffer from several diseases due to malnourishment. Nearly 46.8% of women of reproductive age are suffering from anemia, 23.8% are facing Iron deficiency, 21.4% are facing Zinc deficiency, 30.1% are facing Vitamin A deficiency, and 76% are facing Vitamin D deficiency.[41] The wastage of food worth billions is a severe issue, and policies should be made to check food wastage, which will also decrease food insecurity.

Massive Migration from Rural to Urban Areas

Between 2015 and 2050, the global urban population will almost double. In 2022, around 30 million people were forced to leave their homes due to climate-related disasters.[42] The floods of 2010, which submerged a significant portion of the country, forced over two million individuals to migrate from rural to urban areas in Pakistan. Nearly 70% of those displaced chose not to return to their hometowns, opting instead to establish permanent residences in major cities due to the devastation of their homes and farmlands.[43]

In the 2022 floods in Pakistan, almost 8 million people migrated from rural to urban areas in Pakistan.[44] Approximately 0.7 million individuals migrate from rural to urban areas in Pakistan annually because of floods and droughts. In Balochistan, out of the 515 villages surveyed during the 2022 floods, 178 villages indicated instances of displacement, affecting around 20,000 individuals, with 90 per cent currently residing with host families. Additionally, 69 per cent of the villages noted difficulties in terms of accessibility.[45] This growth is attributed, in part, to individuals migrating from rural regions that have been adversely affected by climate change as they seek economic and social stability in urban areas. However, many urban cities are already struggling with climate issues, from rising sea levels to water shortages.[46] This mix of climate change, population growth, and insufficient infrastructure increases social and economic inequalities. It raises the risk of violence and has a significant impact on people's safety in cities, nationally as well as globally.

To avoid massive migration in the future, the government needs to assess the need to establish more urban centers and create opportunities in areas other than the existing ones. Also, by improving the road and railway infrastructure, people living in smaller towns can easily commute between their cities and the areas with existing opportunities. Moreover, investment in vocational and entrepreneurship training can also reduce the burden on the major urban centers, provided the people in smaller towns can access stable internet and digital platforms.

Way Forward

The impact of climate change on Balochistan is grave. However, the response of the Balochistan Government to address the issues is not proportionate. There is a discernible neglect on the part of the Balochistan Government in implementing the National Action Plan for Hazardous Waste Management Policy 2022.[47] This policy outlines fundamental and essential measures for combating the effects of climate change in our region. Immediate action is imperative. Addressing other pressing issues requiring urgent attention becomes challenging without taking this crucial step. Consequently, the provincial government's approach to the climate crisis appears neglectful, marked by a lack of formulated policies and initiatives. It is necessary to take effective, proactive measures to overcome the implications of climate change. Based on primary and secondary research analyses, the following steps are required to mitigate the impacts of climate change in Balochistan.

Enhancing the Efficiency of Provincial Disaster Management Authority

The Provincial Disaster Management Authority (PDMA) is responsible for disaster management, coordination, and oversight within the respective province.
The PDMA Balochistan is mandated to handle and manage all types of disasters in the province. A multifaceted approach and plan for climate change adaptation, specially created for Balochistan's challenges, must be established, and implemented. A specific budget for training local government employees, disaster management professionals' and concerned locals should be initiated. This should entail actions to increase local adaptability, enhance early warning systems, and reduce the possibility of disasters. It involves teaching people at the grassroots level about climate change, its effects, and valuable techniques for handling emergencies. Enhancing the technical skills of pertinent personnel is essential for efficient catastrophe planning and response.

The Balochistan Government must ensure the availability of sufficient funding for mitigating climate change. This involves allocating funds to create infrastructure for emergencies and capacity building of relief organizations, besides relief goods for calamity-hit areas. Taking early action before floods in Balochistan can make a lot of difference. Early warning systems and preparedness for disasters can save lives and property by allowing people to leave on time and by allocating resources in time. Building good-quality dams and making infrastructure that can resist floods can minimize the impact of floods and make the communities resilient in the long run. This may save Quetta from becoming a dead city.

Adopting Community Lead Pre-Disaster Management Measures

Balochistan must prioritize pre-disaster management over post-disaster management to reduce the scale of destruction caused by natural calamities. There is a need to establish resilient infrastructure capable of bearing the effects of climate change, encompassing challenges such as floods, droughts, and extreme temperatures. This requires the development of buildings, roads, and water management systems specifically designed to endure potential disasters. Early warning systems should be improved and expanded to give reliable information to the population in danger. This entails utilizing technology, communication networks, and community participation to ensure that individuals receive timely notifications and can take the necessary action. Promoting local participation in catastrophe planning and response must be included on the agenda of the relevant departments. Creating public awareness and following emergency protocols can prepare them for disasters at the individual and community levels.

The appropriate authorities should facilitate the active engagement of local communities in protocols and processes for disaster management because they know the relevant disasters they face in their respective areas, and they are the ones who bear the brunt, so their engagement is essential.

Water and Resource Management

Citizens, government authorities, and relief organizations must cooperate in Balochistan to conserve scarce water resources. A comprehensive strategy, including policy implementation, infrastructure development, and innovation, is necessary for effective water use. Following simple steps can effectively manage water and food waste.

Construction of Dams for Storing Rainwater

There is a need for dam construction all over Balochistan. Incomplete dams should also be completed. A resident of Balochistan was asked how they could stay safe from the floodwater. He said excessive water during rains enters residential areas with no drainage system. If dams were constructed in those areas, the water could be stopped or slowed down and redirected before it entered residential areas and crops.[48] Dams must be large enough to hold significant floodwater to avoid overflowing. Ensuring dams have solid structures is crucial to withstand the force of floods and any debris they may carry. It is essential to minimize their environmental impact when constructing dams, considering factors like disrupting habitats and affecting water quality. Dams should be adaptable to changing weather conditions and capable of handling various flood sizes. Designing dams for multiple purposes, such as water storage, aiding agriculture, and generating hydroelectric power, enhances their overall usefulness. Building water storage dams will also help restore the groundwater aquifers. Climate change has repercussions; however, we can also benefit from its implications.

Channelising the Water during Floods

Given its dry environment and vulnerability to flash floods, the Balochistan government needs to implement efficient flood management and water channelization measures. For over a thousand years, the central technology for channelizing groundwater in Balochistan has been the Karez System.[49] Using the old Karez system, excessive water during floods can be channelized, saving the residential area. Afterwards, this water can be used for domestic needs and irrigation.

Regulation of Tube Wells

The main reason for dropping the water table is unchecked and unregulated digging of tube wells, particularly in places like Quetta, Mastung, and Pishin, where the water level drops quickly. Besides the environmental issue, there are some critical social problems because the government promotes using these modern tube wells.[50] The government is digging deeper tube wells in different cities of the province to get more water from the hard rocks under the ground. They are doing this to ensure enough water for everyone in the town.[51] Since the 1970s, tube wells have increased from 5,000 to over 40,000.[52] Quetta alone had over 2,000 tube wells pumping up water, and the issue was further escalated when the number of tube wells increased to 24,000. The government's recent move to drill 3,000 more tube wells is another troubling sign.[53] It is peculiar that the government is trying to fix the problem by digging more tube wells. There is a need to stop drilling such tube wells, which cause the dropping groundwater level. These ill-planned developments must be stopped as a first step to tackling the water shortage.

Technical Solutions for Water Management

Implementing efficient irrigation technologies, such as drip irrigation and sprinkler systems (drip irrigation is a system where water is directly applied to plant roots through a network of tubes, conserving water by minimizing evaporation, while sprinkler irrigation involves spraying water over crops like rainfall, ensuring even distribution and efficient use of water resources)[54] can significantly reduce water wastage in Balochistan. Introducing intelligent water metering and monitoring systems helps track usage and promotes responsible consumption. Employing rainwater harvesting techniques enhances water availability, especially during dry periods. Investing in water-efficient agricultural practices and promoting water conservation awareness further contributes to effective resource management in the region.

Adopting Policies to Save Food

Floods induced by climate change can exacerbate food insecurity through crop damage, infrastructure destruction, and community displacement. As per the Food and Agriculture Organization (FAO), about 3.1 billion people, nearly four in ten individuals globally, face challenges in affording or accessing healthy diets.[55] Addressing food insecurity in these circumstances requires a comprehensive approach encompassing preparedness, immediate response actions, and sustained efforts for long-term recovery.

The FAO suggested four ways to reduce food insecurity. Since nearly 40% of all the food grown is not eaten, there is a chance to save it to lessen food insecurity. Firstly,

we must step in and ensure nutritious food does not get lost or thrown away as it goes from the farm to our plates. People should also get help in using food wisely. Developing new and better ways to grow, store, deliver, and eat food can ease the strain on the food systems and stop good food from going to waste. Secondly, Education frequently catalyzes bringing about change. When people are more informed about the existing challenges, it becomes simpler to create solutions. This educational process should mainly involve young individuals. As prospective leaders and contributors to our food system, young people are pivotal in formulating and expanding innovative solutions to address food insecurity.

Thirdly, we require advocacy, activism, and increased assistance for at-risk communities. Collaborating with policymakers and making the call for change louder from both industries and consumers is crucial. This way, new policies, innovations, and economic measures can be made possible to lessen the impact of food insecurity. The support should be specific and targeted, considering cultural and socioeconomic conditions or climate-related challenges. Fourthly, a primary reason for food insecurity is the difficulty of accessing nutritious and reasonably priced foods. Even if the food is accessible, it might not be healthy enough for a person or a community to have a well-rounded diet. Better and upgraded food options are often needed to address this issue, especially regarding protein sources.[56]

Individual Level Steps

By taking specific individual-level steps, we can mitigate the impacts of climate change in Balochistan by planting less water-consuming trees, using solar panels or renewable energy sources, decreasing energy wastage, or consuming less energy or energy-saving appliances, using public transport instead of personal vehicles, decreasing water wastage, and consuming and wasting less food.

Bringing International Attention

Bringing international attention to climate calamities in Balochistan is the most crucial step. The Conference of the Parties (COP) 28 will be an excellent platform for Pakistan to represent its concerns related to climate change and convince the significant polluters to take more effective steps to overcome the crisis. However, South Asian countries have already been actively working to seek compensation from wealthy countries for those most affected by climate change.

At COP 27 in 2022 in Egypt, Pakistan took the lead in a coalition of 134 states advocating for creating a Loss and Damage Fund to compensate nations significantly

impacted by climate change.[57] In the COP 28 Summit in 2023 in the United Arab Emirates, a committee has been set to allocate compensation and funds to affected countries.[58] This climate finance encompasses local, national, or global funding from diverse sources such as public, private, and alternative channels to support efforts addressing climate change through mitigation and adaptation actions. The Convention, Kyoto Protocol, and Paris Agreement highlight the importance of financial aid from more affluent Parties to those less endowed and more vulnerable, acknowledging the varied contributions to and capacities for dealing with climate change. Mitigation efforts require substantial investments to significantly cut emissions, while adaptation relies on significant financial resources to address and minimize the impacts of a changing climate.[59] Addressing climate change vulnerabilities in Pakistan requires working together through diplomacy, international financial assistance, sharing technology, and joint projects. These initiatives aim to enhance resilience, mitigate vulnerabilities, and encourage sustainable development in response to climate challenges.

Conclusion

There is a profound fear that climate change, which has severe implications for the livelihood of people living in Balochistan, may lead to an increase in conflicts in Balochistan. Balochistan's socioeconomic and political problems are already worsening because of climate change. Many of the province's population depends on agriculture for their livelihoods, and climate change impacts animal breeding and crop harvests. Droughts, erratic rainfall, and severe weather may hinder cattle health, diminish agricultural land, and destroy crops. Disputes can emerge over scarce resources, food shortages, and financial difficulties owing to these changes. Such changes may exacerbate already-existing issues, such as disputes over who can utilize specific resources among the ethnic communities. Regardless of how it affects the rest of the world, climate change adversely impacts the underprivileged people in Balochistan. If issues brought on by climate change are disregarded, the grievances of people who have already been discriminated against on socio-economic and political fronts will not end.

While there is cause for concern that conflicts may arise in Balochistan because of climate change, there is also an opportunity to profit from natural calamities such as floods. Floodwaters may restore groundwater and bring moisture to this arid region. They can also produce organic soil, which will help the agriculture sector. Additionally, they provide chances for collaboration, creative thinking, and community-driven solutions.

A comprehensive strategy that blends diplomatic endeavors, regional collaboration, and community involvement is crucial for tackling the upcoming challenges. By tackling the fundamental causes of vulnerability, supporting sustainable

resource practices, and promoting inclusive governance, stakeholders can strive for a future in which Balochistan adjusts to climate change and develops resilience and unity within its communities.

Local and global communities must understand how climate change and conflicts are connected. Acting early, like managing resources wisely, involving communities, and finding peaceful solutions, is crucial. Dealing with climate change challenges in Balochistan requires a comprehensive plan that considers the environment and the economy from a people-centric approach. Working together, adopting strict control measures for monitoring and evaluation, and planning for the long term is a key to making Balochistan resilient in the face of climate change and its adverse impact. Acknowledgement and a strong will are needed to adopt a proactive approach at the individual and national levels to mitigate the effects of climate change on Balochistan.

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