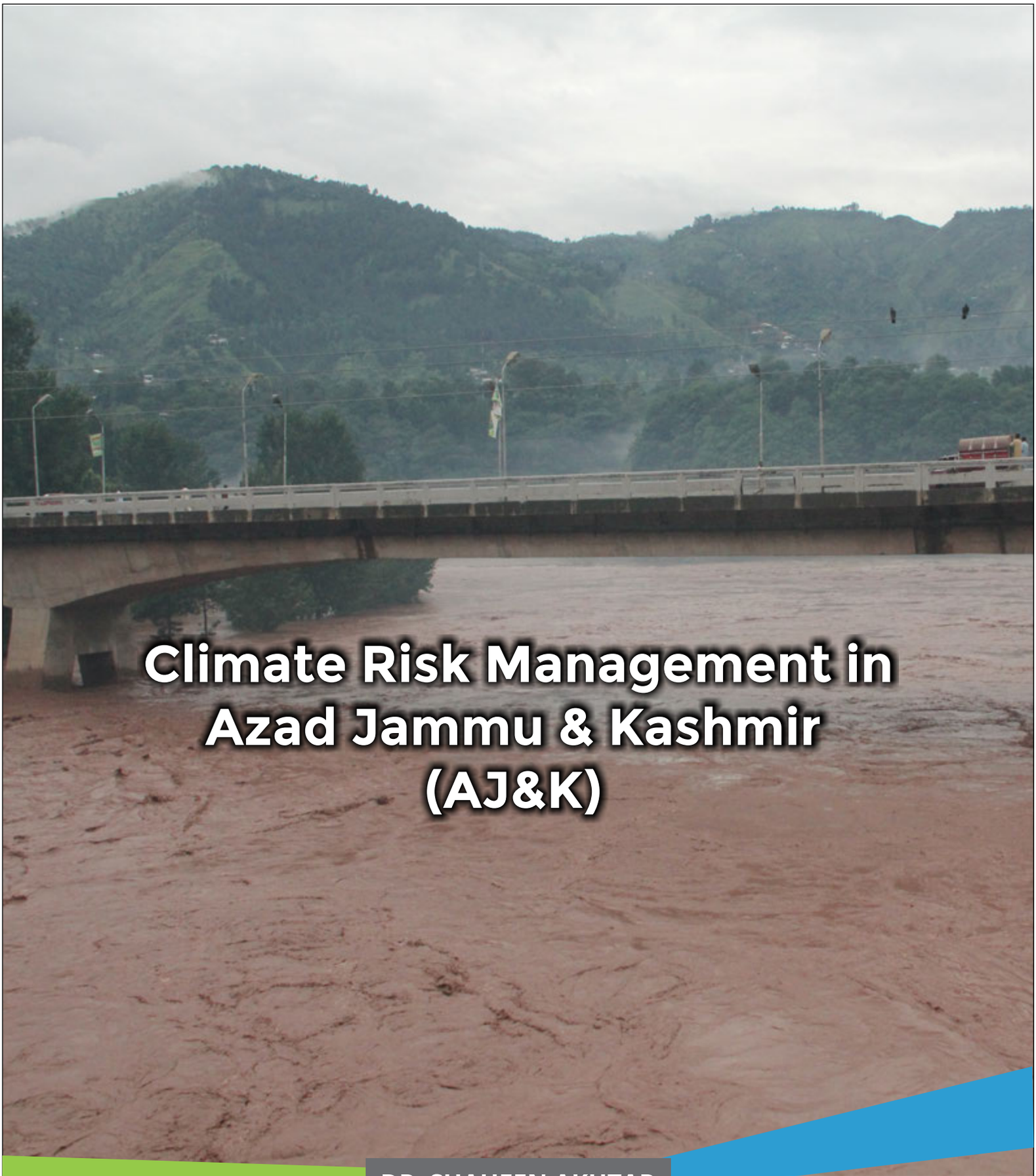

Climate Risk Management in Azad Jammu & Kashmir (AJ&K)

DR. SHAHEEN AKHTAR

2024

Centre for Peace, Development and Reforms (CPDR)

Climate Risk Management in
Azad Jammu & Kashmir (AJ&K)
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INTRODUCTION

The State of Azad Jammu and Kashmir (A&JK) is one of the most climate-sensitive regions within the Himalayan belt because of its location (longitude 73o -75o and latitude 33o -36o) and geographical diversity- stretching from the north region of the high mountains to tropical arid zone in the south. The natural resources, glaciers, water, forests, fisheries, and connected biodiversity are vulnerable to the impacts of climate change. In addition, communication, physical infrastructure, and power sectors are at risk, seriously affecting the economy. The major drivers of the climate change in AJ&K, besides rising temperature, erratic monsoons, and variations in precipitation levels, are environmental degradation mainly caused by anthropogenic pressures such as growing population, urbanization, deforestation, soil erosion, infrastructure development, pollution of rivers and subsoil water. [1] The region is already witnessing increased frequency and intensity of extreme weather events such as flash floods, river floods, landslides, snow avalanches, wind storms, wildfires, and droughts. The foremost sectors impacted are the environment, water resources, forests' biodiversity, agriculture and livestock, trade and Industry, physical infrastructure, energy, tourism, and health.[2] These impacts are likely to deteriorate human security conditions and livelihood opportunities for the local population which may pose wide-ranging political, socio-economic and governance-related challenges and cause climate-induced conflict and migration. The region is already reeling under the larger impacts of the Kashmir conflict, which has constrained its economy.

The existing literature on the impacts of climate change in AJ&K is more generic and scattered. During the last few years, some effort has been made by the federal and AJ&K governments to evolve policies and institutional structures to cope with the climate crisis-environmental degradation, water scarcity, and climate-induced disasters. In addition, UN agencies, donor agencies, i.e., ADB, World Bank and national NGOs, have also produced reports that discuss challenges emerging from the climate crisis to Pakistan's water security and hydro-metrological disasters. However, there has not been any specific study that looks at AJ&K's physical, economic, social, and environmental vulnerability to the climate crisis, its consequences for existing human conditions and developing coping and adaptive capacity of the local government and communities.

There is an urgent need to understand the drivers of AJ&K's vulnerability to the climate crisis, including its major drivers and impacts that may affect people's lives. It is also important to examine the climate change policy and adaptation strategy of AJ&K, the coping and adaptive capacity of the state government's institutions and communities at large, and

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[1] See, *Stakeholders Recommendations for Climate Change Implementation Framework*, AJK, https://www.csccc.org.pk/ *AJ&K Climate Change Policy, Climate Change Center, Planning and Development Department*, Azad Government of State of Jammu and Kashmir, August 2017. https://pndajk.gov.pk/ *State Disaster Risk Management Plan, 2017*. http://sdma.pk/

[2] Stakeholders Recommendations for Climate Change Implementation Framework, AJK.

how it can be transformed into long-term sustainable adaptive capacity. Finally, another important aspect is to see how climate crisis may interact with overall conflict dynamics in the Kashmir region and what can be done to mitigate climate-induced tensions in the conflict-prone zone of Kashmir by building the transformative adaptive capacity of the institutions and communities.

Methodology

The study is based on a desk review of the existing literature on the climate sensitivity of AJ&K and how the State's institutions and communities are coping with current climate variability. In addition, extensive fieldwork and focused group discussions were conducted with key stakeholders comprising government officials in – the State Disaster Management Authority (SDMA), Environmental Protection Agency (EPA), Planning and Development-policymakers, political leaders and civil society actors, i.e., media and academia. The FGDs were organised in Muzaffarabad, Mirpur and Islamabad during May-June 2022. In addition, key informant interviews were conducted across AJ&K to enrich the analysis.

I. Ecological Resources and Climate Change Trends

With a total landmass of 13,297 sq. km, the State of AJ&K is divided into ten districts within the larger divisions of Mirpur, Poonch and the capital Muzaffarabad. It is an administratively autonomous region within the Federation of Pakistan. The population of AJ&K has grown from 4,045,366 (2017 census)to 4,319,394 in 2022, with an 88:12 rural-urban ratio and 49.7 percent female population. [3] The overall literacy rate of 76.80 percent is significantly higher than 60 percent national figures. The infant mortality rate (IMR) 51 and maternal mortality rate (MMR) 104 are also better than the national figures of 56 and 186, respectively. However, AJ&K is lacking in population per doctor, i.e. 3,963, compared to the national figure of 898. However, the unemployment rate is 10.7 percent, much higher than the national figure 5.8 percent [4] The high pressure of population on land has led to very small size of landholdings, which varies roughly from 0.93 hectares in District Bagh to 3.66 hectares in District Mirpur. The average farm area per family in AJ&K is 1.76 hectares. Within this context, it should be underscored that AJ&K is more susceptible to the effects of climate change because of its agrarian base and high dependency on natural resources for livelihoods. Most of the rural population depends on forestry, livestock and agriculture for subsistence. Geographic location and diversity, rising temperature, melting glaciers, erratic rainfall, deforestation, desertification, population growth and urbanization are major factors worsening climatic stresses. The region's socioeconomic development indicators show regional disparities that may intensify as climate change is likely to affect vulnerable populations much more than less vulnerable. A study titled *AJ&K District GDP Estimates Using Nightlights Data* indicates that districts of Kotli and Mirpur occupy the top two ranks in overall size of local economy and Neelum and Haveli districts occupy the bottom two ranks over the period 2010-2020. In terms of per-capita GDP, Mirpur has the highest rank and Sudhnoti has the lowest rank, and it is 13 times less indicating huge disparity among districts. Similarly, the top five ranked districts on the basis of size of GDP, contribute

[3] AJ&K Bureau of Statistics, Planning and Development Department AJK. https://pndajk.gov.pk/

[4] Ibid.

around 80 percent to the AJ&K's economy in 2010 and this percentage increases to 90 percent in 2020 indicating growing disparity over time.[5]

A. Geo-ecological Landscape

AJ&K is mainly a hilly and mountainous region with valleys between Neelum district and Poonch district and stretches of plains to the south of Poonch district. The districts of Neelum, Muzaffarabad, Bagh, Poonch, Kotli and Sudhnuti districts are in the mountainous zone, while Mirpur and Bhimber districts lie in the foothills. In the extreme north, the high mountains of the Himalayas form the lofty ridges of the Nanga Parbat massif, with the highest point being 6,359 meters. The Jhelum-Neelum watershed in Muzaffarabad district, as well as Poonch and Sudhnoti districts, form a mountainous terrain in the north, which comprises the foothill ranges of the outer Himalayas that rise to 3,758 meters above sea level (masl) in the Pir Panjal in the centre but generally form the mountain ridges averaging from 1800 to 2750 metres in height. [6]

The Pir Panjal Range constitutes the first mountain fortification associated with the Himalayas and is the westernmost of the Lesser Himalayas. It has an average crest line of 3,800 metres, with individual peaks rising to 4,600 metres. The entire Pir Panjal system is about 2621 km in length and 50 km in breadth. Banihal Pass (2832 metres), lying in the shape of a tunnel on its peak, remains covered with snow during winter, making it impassable. The 2.8 km long Jawahar Tunnel was constructed here in 1956 at 2,200 metres above sea level (masl). On the other end of this range lie the strategic Baramula pass (1582 metres) and Hajipir pass (2750 metres).

The Sub-Himalayan zone constitutes the lower part of Neelum Valley, while the lesser Himalayas form its central part and are separated from the former by the main boundary thrust exposed near Nauseri in the south and from the Higher Himalayas in the north by the main central thrust identified near Lawat village. [7] The narrow strip of land in southern Mirpur and Bhimber districts and the extreme south of the state constitute the plains similar to those of the adjacent Punjab.[8]

[5] "AJ&K District GDP Estimates Using Nightlights Data", Azad Government of the State of Jammu and Kashmir, 2022. Planning & Development Department, Azad Government of the State of Jammu & Kashmir. https://www.pndajk.gov.pk/. p. ix.

[6] Mirza Arshad Ali Beg, Environmental & Social Profile of Districts of Azad Jammu & Kashmir**",** August 2015. Project: 6. Poverty V/s Impoverishment

[7] Ibid.

[8] Ibid.

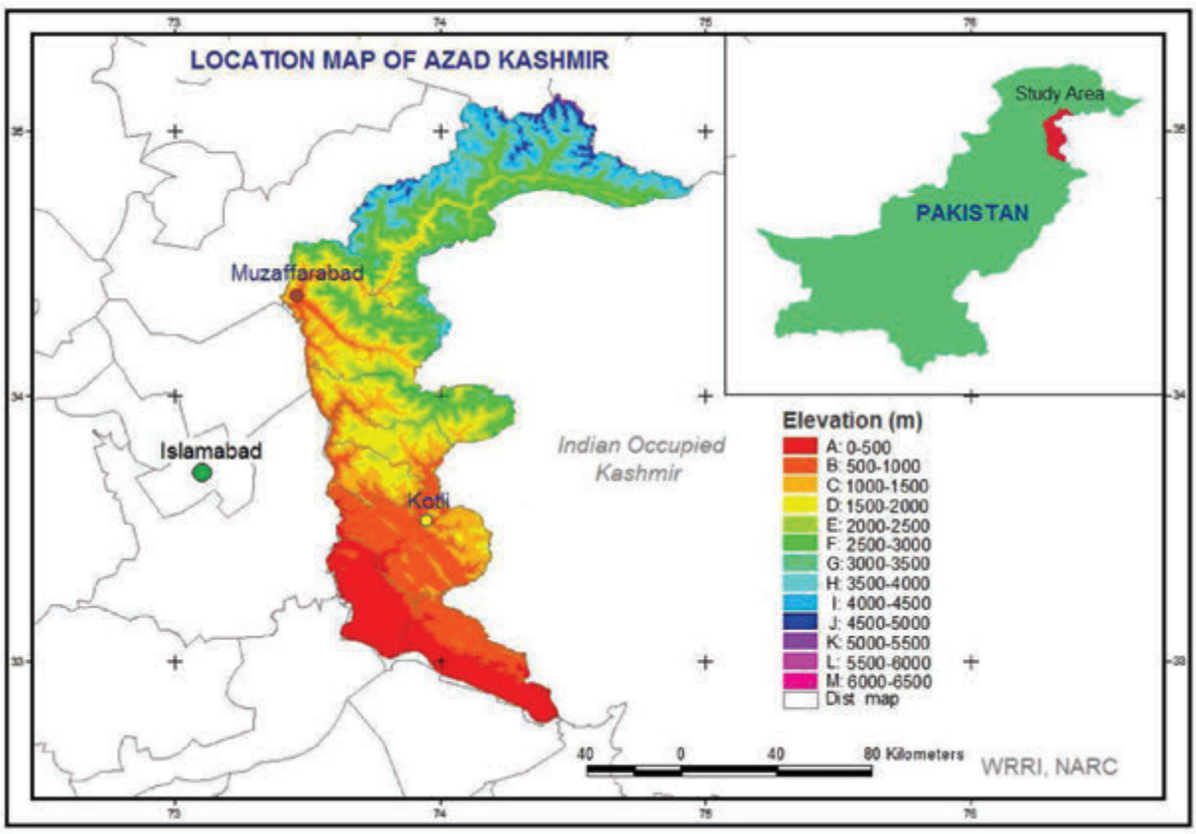


Figure 1: Location map of AJ&K indicating various elevation ranges

B. Rainfall Patterns

Depending on the altitude, which varies from 360 meters in the south to 6,325 meters in the north, AJ&K has a wide range of climatic conditions. There are eight agro-climatic zones, i.e. (i) Glaciers and cold caps; (ii) Very cold temperate continental winter rains; (iii) Cold dry temperate continental winter rains; (iv) Very cold temperate continental winter rains and monsoon; (v) Cold temperate continental winter rains and monsoon; (vi) Moist warm temperate continental winter rains and monsoon; (vii) Humid warm subtropical continental winter rains and monsoon; and (viii) Sub-humid hot subtropical continental winter rains and monsoon.[9]

The South has a dry sub-tropical climate, while the North has a moist temperature. There is significant variation in the rainfall pattern across different regions of AJ&K. Average annual rainfall ranges from 1,000 mm to 2,000 mm, with the highest average rainfall occurring near Muzaffarabad. In the northern districts 30 percent to 60 percent of precipitation is in the shape of snow. In winter, the snow line is around 1,200 meters, while in summer it is 3,300 meters. In summer, the maximum average temperature ranges from 20°C to 36°C while in winter, the minimum average temperature range is 04° to 07°C. The Neelum Valley in the northern zone has a temperate climate with prolonged and severe winters from December to May. In winter, snow falls with an average depth of snow accumulation of 3-4 meters up to 3,000 meters elevation whereas 4-6 meters at higher elevations. The southern zone has a climate similar to Punjab's neighbouring areas. The summer season starts in April and lasts till October, with June being the hottest month. The maximum temperature is often around 45°C from May to September. Rainfall is concentrated in the monsoon season from late

9.Climate Change Implementation Framework, AJK, https://www.csccc.org.pk/. p. 9.

June to the end of August. There is often a prolonged dry period from October to early January followed by winter rains from January to March.[10]

Current climate data and future projections suggest that the climate in AJ&K is changing at an unprecedented rate. Pakistan Meteorological Department (PMD), Temperature and rainfall records over the last fifty years (1960-2007) show rising climate trends in the region, with average maximum temperature increasing to 0.82 degrees and precipitation to 75mm. This has resulted in a number of extreme weather events, such as flash floods and delays in normal rainfall patterns.[11] The average maximum and minimum temperature rose from 24°C and 12.3 °C in 1962 to 27.2 °C and 12.6 °C in 2013, respectively. The annual average precipitation shows increasing as well as decreasing trends from 1962 to 2013. The annual average precipitation changed from 1086 mm in 1962 to 1340 mm in 2013.[12] The seasonal rainfall patterns are changing and are becoming more erratic. The PMD data also shows that the region is experiencing longer hot days, increased heat waves in the summer, and decreased cold waves in the winter. The analyses presented by PMD show that the region has been getting one extra month of summer yearly, similar to the rest of Pakistan, since 1980. The increase in temperature and precipitation has adversely impacted the glaciers and biodiversity in the region, which can have negative effects on the state's ecosystem. In fact, increase in the number of glacier lakes demonstrates the effects of prolonged heat waves over the region.[13]

C. Water availability

The region's water resources are quite sensitive to the impacts of climate change on glaciers, rivers, stream flows and springs. All the major Himalayan rivers have their source in the High Himalaya region of Kailash. The Indus in the north, the Yarlung - Brahamputra in the east, the Sutluj in the west and the Ganges, and Karnali streams to the south and southwest. The major rivers flowing through AJ&K- Jhelum, Neelum and Poonch are part of the trans-boundary Indus rivers system between India and Pakistan. The outlet to the drainage of the Jhelum River watershed across the LoC is at Baramulla, from where the Jhelum flows through a narrow gorge into AJ&K.

Water availability in AJ&K is limited to 3.5 to 4.5 billion m^3 of the surface runoff - 34 to 35 billion m^3. This suggests the per capita availability of water at about 1000 m^3. This places AJ&K marginally above the water-stressed regions and implies that the forested areas, rangeland and agricultural lands in the valleys may have sufficient water but the corresponding areas that may also include the towns and villages that are at far off distance from the river and stream systems, may face critical situations in case of lower rainfall. Such areas may accordingly remain underdeveloped.[14]

The forests; rangeland; agricultural land on which people practice subsistence agriculture, and municipalities utilize an estimated 70 percent of the input of 3.5 to 4.5 billion m^3 water or about 2.8 billion m^3 annually. Water supply to the urban or rural water supply system

[10]Bureau of Statistics, P&DD, Azad Govt. of The State of Jammu & Kashmir, Muzaffarabad. https://www.pndajk.gov.pk/ p.3.

[11] https://climateinfo.pk/

[12] AJ&K Climate Change Policy, Climate Change Center, Planning and Development Department, Azad Government of State of Jammu and Kashmir, August 2017. https://pndajk.gov.pk/

[13] https://ciic.pmd.gov.pk/

[14] Mirza Arshad Ali Beg, Environmental & Social Profile of Districts of Azad Jammu & Kashmir**",** August 2015. Project: 6. Poverty V/s Impoverishment.

takes a small share of 0.2 billion m^3 of the total water available in AJ&K. Water requirement of the industries is also low.[15] As most of the rural population of AJ&K depends on agriculture, forestry and livestock for subsistence, 13 percent of the total state land or 166,432 hectares is under cultivation. 92 percent of the cultivable area is rain fed, with major crops including maize, wheat and rice. 42.6 percent of the land area is controlled by the forest department. AJ&K has 11.6 percent of its area under thick forest cover where varieties of Deodar, Kail, Blue Pine, Silver Fir and Chir Pine grow. 16.9 percent area consists of thinly wooded forests. AJ&K is home to 8 National parks, namely Deva Vatala, Ghamot, Gurez, Machiara, Pir Lasura, Poonch River Mahaseer, Toli Pir, and Panjal Mastan, as well as game reserves and wildlife sanctuaries.

Access to Drinking Water: The main drinking water supply system source in AJ&K is surface water from rivers and running streams, besides groundwater. 80 percent of the urban population in the 22 towns in AJ&K and 73 percent of the rural population have been provided piped water supply through house connections and public stands.[16] Rivers and springs are the main drinking water sources in the northern part of the AJ&K while hand bore wells are the major source of drinking water in the southern part. In the urban areas of AJ&K, 44 percent of the population has access to a piped water supply, while 57 percent of the population of rural areas has been provided with piped water. The accessibility of water is also unevenly distributed. The study by the World Bank in AJ&K found that 78 percent of females, including girls of less than 18 years of age, are responsible for fetching water at the household level, spending up to 15 minutes traveling and queuing at a water source in both rainy and dry seasons.[17]

The impact of the October 8, 2005 earthquake has been profound on the water supply systems and their source. The water supply systems have been damaged while the water sources have been substantially altered or are not dependable after the earthquake as several existing springs, wells and tube wells have fallen dry due to shifts of groundwater aquifers.[18] The earthquake displaced streams and the forces operating under the ground changed the underground structures, thereby dislodging or burying a number of freshwater springs or causing them to change course and dry up.[19] Some springs have stopped flowing after the earthquake. Furthermore, the walking distances to water sources have aggravated the situation, especially for women and girls, who are traditionally responsible for water collection.

The earthquake affected districts did not have adequate water supply infrastructures to start with; the tremors damaged the natural sources on which the people had been relying for their source of water. At Burka, a group of villages in Bagh district, about 3,000 people were receiving their water supply from three springs two of which dried up after October 8, 2005. The water in the third spring also decreased subsequently.[20] The earthquake also caused many springs that did not have water to suddenly start flowing again. Muzaffarabad

[15] Ibid.
[16] Ibid.
[17] *Stakeholders Recommendations for Climate Change Implementation Framework, AJK*, p.16.
[18] Mirza Arshad Ali Beg, Environmental & Social Profile of Districts of Azad Jammu & Kashmir",
[19] Ibid.
[20] Ibid.

of Dhirkot subdivision, Bagh district witnessed an increase in water flow after the earthquake, but the spring dried up after a short while. This was because of the change in the flow pattern of groundwater. However, the springs in the hilly areas of AJ&K are recharged by rainfall that balances the drawdown. If rainfall is lower than water consumption, the few springs that start flowing suddenly dry up eventually. This is usually the case during drought conditions.[21]

II. Manifestations of Climate Change in AJK

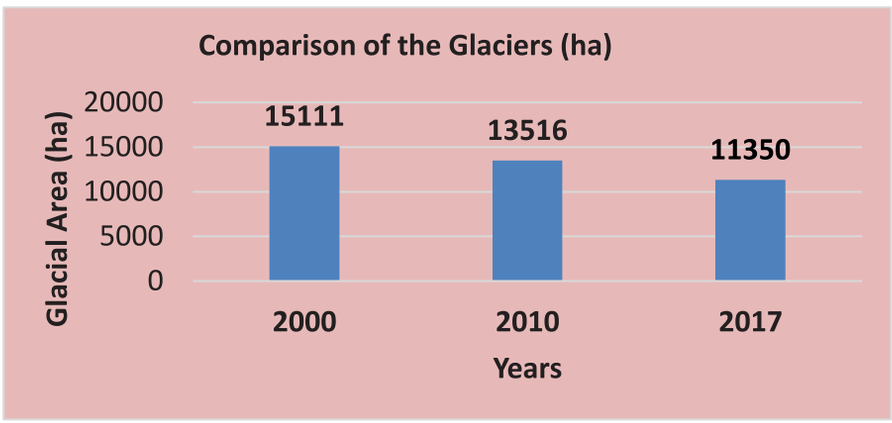
The climate crisis has impacted AJ&K in a varied manner due to its diverse geographic conditions. It has led to shrinking glaciers, and accelerated frequency and intensity of extreme weather events resulting in hydro metrological disasters, including flash floods, river floods, landslides, avalanches, glacier lakes and droughts. The inadequate flood forecasting and early warning system only aggravate the situation. There is a weak early warning system, alert warning issuance and communication system to vulnerable communities in the region for flash flooding and land sliding. AJ&K relies on the alerts and warnings issued by the Pakistan Metrological Department (PMD). The warning issued by PMD is more generalised and often suffers from low accuracy. This is because the weather radars of PMD do not specifically cover the entire AJ&K.[22]

A. Shrinking Glaciers leading to hydro metrological disasters:

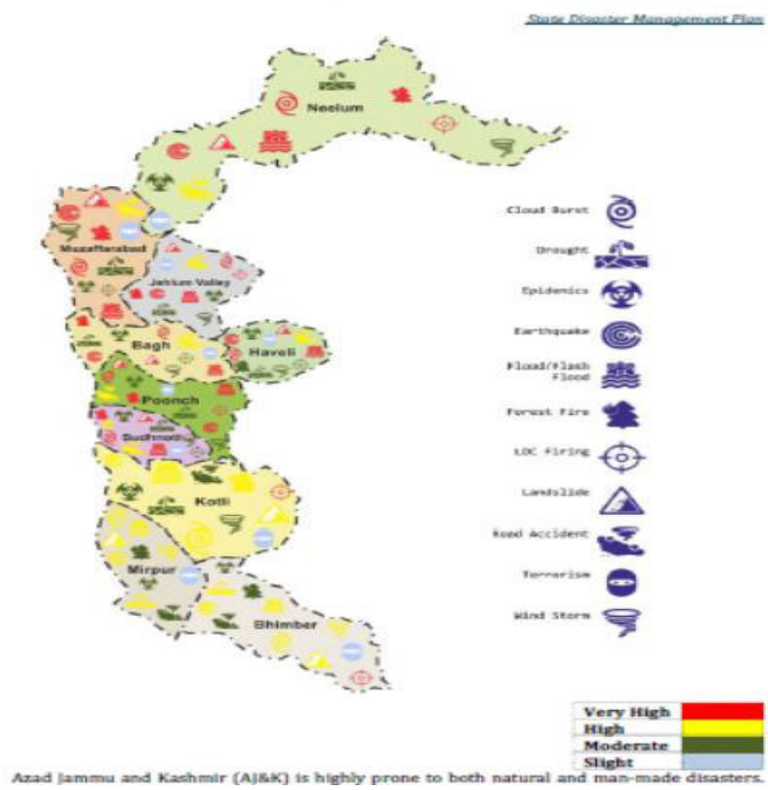
The glaciated area of AJ&K comprises 224 glaciers containing ice reserves of about 4.9 km3. It constitutes over 0.8 percent of the AJ&K area and 3 percent of the Neelum district area. About 49 percent of the glaciated area and 61 percent of the glacial lakes area lie within the 4000-4500m elevation range. The surface coverage of two large glaciers i.e. Sarawali and Shonthar indicates the influence of topography and the surrounding environment. Maximum coverage of about 38 percent of Sarawali glacier falls in the 3500-4000m range while 33 percent of Shonthar glacier[23] in the 4000-4500m range. There is a gradual decrease in the glacial area of Sarawali upward 5000 masl. Although Shonthar indicates a similar trend but there is an increase in coverage (25 percent) within 5000-5500m range likely due to merging of branch glaciers from the surrounding.[24] Glaciers react very sensitively to climate fluctuations, and thereby provide some of the clearest evidence of ongoing climate change.[25]

[21] Ibid.
[22] Interview with Saeed Qureshi, Director Operations, SDMA, AJ&K, 28 March, 2023.
[23] Shonthar Glacier is situated close to the village Upper Domail and the hamlet Chhilin Das Baihk.
[24] Ashraf, A., R. Naz, R. Roohi, "Monitoring and Estimation of Glacial Resource of Azad Jammu and Kashmir Using Remote Sensing and GIS Techniques". *Pakistan Journal of Meteorology*, Vol. 8, Issue 16: Jan 2012. http://www.climateinfo.pk/frontend/web/attachments/data-
[25] Ibid.

Glacial Retreat in AJ&K 2000-2017



Source: State Disaster Management Authority (SDMA), AJ&K.

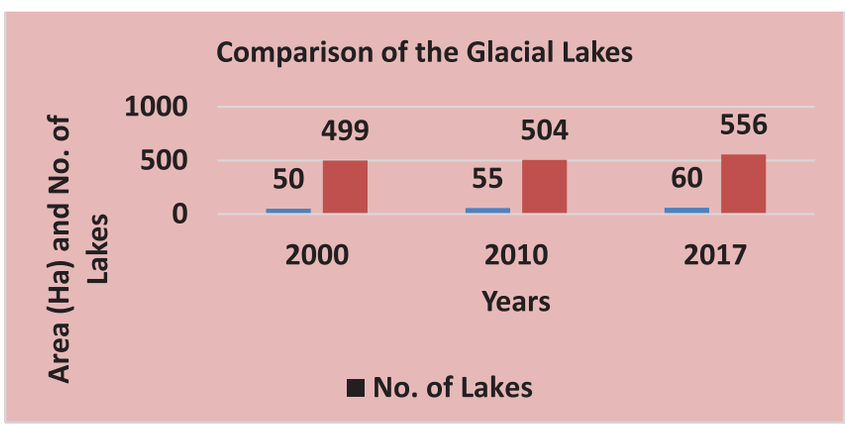


Hydro metrological Disasters:[26] Climate change has accelerated glacial melt and retreat, which is resulting in the formation of hazardous glacial lakes in the Himalayas, which are geologically young and fragile and are vulnerable even to insignificant changes in the climate. This is resulting in shrinking glaciers, which is leading to the increased threat of flash and river floods, avalanches, landslides mud flow to downstream areas, and wild fires.

[26] Hydro Metrological Hazards is a group of hazards related directly or indirectly to the rain like flash floods, cloudburst and lightening. Intense/heavy rains, catchment bursts, steep slopes, soil texture and unguarded deforestation induce severity to their destructions. *Neelum District Disaster Risk Management Plan 2017,* p.19.

***Growth in Glacier Lakes*:** Glacier thinning and retreat in the Himalayas had resulted in the formation of new glacial lakes and the enlargement of existing ones due to the accumulation of melt water behind loosely consolidated end moraine dams that had formed when the glaciers attained their Little Ice Age maxima .[27] There are 76 glacial lakes identified in the AJ&K, mostly concentrated in the largest northern district Neelum, about 53 percent lakes belong to Erosion type and 20 percent to Cirque type. The high number of erosion-type lakes in this area indicates the receding of glaciers, likely due to past global environmental changes. [28] The glacial retreat leads to the creation of new lakes. In 2000 the number of glacial lakes was 50, which increased to 55 in 2010 and 60 in 2017. [29] Saeed Qureshi, Director Operations, State Disaster Management Authority said that the glaciers of Neelam Valley are melting, which causes sudden floods in rivers and glaciers lakes. [30]

Comparison of the Glacial Lakes in AJ&K: 2000-2017



Source: State Disaster Management Authority (SDMA), AJ&K.

B. Increased flooding events

***Flash Floods, Monsoon Floods*:** Increased variability of rainfall events, changes in their frequency and intensity, and melting of glaciers result in increased flooding events in AJ&K. During the summer, monsoon floods of the rivers Jhelum and Neelum are common due to extreme rains and snow melting. Muzaffarabad, Hattain, Neelum, Bagh, Poonch, Sudhnuti, Haveli, Kotli and Bhimber are highly susceptible to flash floods and catchment bursts. Excessive rains and steep slopes are among the major reasons for flash floods. [31] The 2010 flood and flash flooding of 2012, 2014, 2015, 2020, and pre-monsoon rain-induced devastation in 2016 caused enormous economic and life losses. Land encroachments along the river banks and nullah beds in the urban and semi-urban areas are major contributory factors.

In the last few years, there has been an increase in the frequency of cloud-burst-induced floods in the Neelum Valley that have caused human and material losses. In August 2022, hundreds of tourists were trapped, and many houses and vehicles were washed away

[27] Monitoring and Estimation of Glacial Resource of Azad Jammu and Kashmir Using Remote Sensing and GIS Techniques".
[28] Ibid.
[29] State Disaster Management Authority, AJ&K.
[30] FGD held in Islamabad, May 20, 2022.
[31] *State Disaster Risk Management Plan, 2017*. p. 34.

following a cloudburst-triggered flash flood in the Neelum Valley. Five houses, three mini hydel power stations, and vehicles were also destroyed by the floodwater.[32] In July 2021, around 30 houses were destroyed following a cloudburst triggered flash flood in the Salkhala area of the Neelum Valley. [33]

Monsoon Disaster History 1992-2022

Year	Affected Districts	Persons affected	Deaths	Injured	Houses Destroyed	Socio-Economic Loss
1992	All Districts	125,000	322	1,375	21,920	Infrastructure, livestock, cash crops, orchards. A 1.25 million of population adversely affected
2006	MZD and Bagh	14	27	45	622	Population of 31 villages affected
2010	Neelum, MZD, Hattian, Bagh	14,459	69	79	10,616	Infrastructure, Livestock, Cash Crops, Environmental degradation /losses
2011	Hattian	1,300	-	-	49	Infrastructure damages
2012	All Districts	12942	52	25	2,092	Infrastructure, human and property losses besides environmental degradation
2013	All Districts	1,644	35	15	274	Public & private property losses & environmental degradation
2014	All Districts	91,950	56	87	15,325	41 shops, 82 Water mills, 203 cattle, agricultural & Multi sectoral loses
2015	All Districts	2856	26	05	408	10 Shops, 06 Cattle,
2016	All Districts	9024	31	21	1409	43 shops, 21 Cattle
2017	All Districts	228	13	5	30	Infrastructure damages
2018	All Districts	448	23	31	64	06 Vehicles,02 Cattle Sheds
2019	All Districts	924	42	18	132	04 School 43 shops, 69 Cattle, 23 Mills,
2020	All Districts	1176	12	09	168	03 School 02 shops, 11 Cattle, 23 Mills,
2021	All Districts	161	09	04	23	03 Vehicles, 01 Police Station, 01 Public health Office partially damaged
2022	All Districts	3885	48	24	555	09 Mills, 05 Vehicles, 08 Pedestrian Bridges, 01 School

Source: State Disaster Management Authority (SDMA), AJ&K.

- The population in the State has become more vulnerable due to increasing exposure to flash floods in mountainous regions related to climate change and extreme weather events. These floods caused extensive damage to human lives, property, physical infrastructure, agricultural land, and livestock. It also increases the incidence of diseases and insects/pests. The excessive soil erosion arising from this results in the reduction of arable lands, which negatively affects food production, food quality, and nutritional availability in the crops that in turn, impacts food and economic security.

[32] Cloudburst causes flash flood in Neelum Valley", *The Nation,* 17 August, https://www.nation.com.pk/17-Aug-2022/cloudburst-causes-flash-flood-in-neelum-Valley

[33] "Cloudburst-induced flood destroys 30 houses in Neelum Valley, couple goes missing", *Dawn* 13 July 2021. https://www.dawn.com/news/1634848

C. *Recurrent landslides & avalanches:*

The landslides pose extreme risks in Neelum, Muzaffarabad, Haveli, Hattain Bala, Bagh, Shudhnoti, and Poonch districts. District Muzaffarabad is highly susceptible to landslides. Before the 2005 earthquake, the mountains and the earth were comparatively compact, but the 2005 earthquake brought the structures down to the ground. It also altered the compaction status of the mountains, rendering a great threat of land sliding to the area. Deforestation makes the mountains bald and barren, leaving slopes susceptible to landslides. In Muzaffarabad district, landslides mainly occur during the monsoon season (July to September) due to torrential rainfall. Kohala, Barora, Kulian and Rara are major landslides at Kohala-Muzaffarabad Road. Kamsar, Kahori, Chalpani, Davlian and Noseri are threatening types of landslides at Muzaffarabad – Neelum road. Lohar Gali is one of the worst landslides located on Muzaffarabad-Mansehra road. [34] Landslides not only threaten the human lives but are also dreadful for the roads and other networks, which are hit hard, resulting in road blockades and electrical and communication problems, especially in the peripheral areas of Muzaffarabad.

Landslides are one of the worst and most frequently occurring hazards in the Neelum district, intensified by the effect of the earthquake that has rendered the soil loose, especially on the slopes. Even a minute of seismic activity and heavy rains triggered massive landslides, causing the fatal effects and destruction of properties. During the summer season when the snow melts and during the rainy season, landslide becomes a routine occurrence in District Neelum. During such time, the main and the only road link of Neelum to other districts of the State is blocked by land/rockslides at many points that sometimes take weeks to be cleared.[35] Steep slopes, intense rainfall, deforestation, high-speed roaring rivers and nullahs, road constructions also contribute in land sliding. Communities living on edges and steep slopes and communities settled in far-flung areas and at high altitude in the district are at higher risk.

Neelum District is also vulnerable to avalanches triggered by heavy snowfall. The frequency of avalanche incidences increases during winter and there is a perceived increase in the frequency of occurrence of this hazard after the earthquake in 2005. Avalanches happen mostly in the north-eastern portion of the district. Most fatal incidents are found to have occurred in Surgan Valley areas. A massive avalanche incident was recorded in March 1996 when 32 people were killed after an avalanche engulfed homes in several villages in the north-eastern part of Neelum Valley. In the year 2005, a ten-year- old avalanche recurred and killed 47 people, injured 38, destroyed 152 houses, and damaged 265. Power supply was also badly disrupted and damage was caused to poles and grid stations. In February 2012, an avalanche struck in the union council Guraiz of Neelum district which killed 5 people leaving 15 injured and 5 houses damaged. The same year, in December 2012, 21 people, many of them soldiers, were killed after they were hit by a massive avalanche in the

[34] *Muzaffarabad District Disaster Risk Management Plan 2017,* District Disaster Management Authority, *Muzaffarabad*, AJ&K, Disaster & Climate Resilience Improvement Project (DCRIP) Planning & Development Department, Azad Govt. of State of Jammu & Kashmir. p.15.

[35] *Neelum District Disaster Risk Management Plan 2017,* District Disaster Management Authority, Neelum, AJ&K, Disaster & Climate Resilience Improvement Project (DCRIP) Planning & Development Department, Azad Govt. of State of Jammu & Kashmir. p. 14.

Sharda area of Neelum district. In 2020, 59 people were killed due to snow sliding in Bakwali and Seri in the Surgan area in Sharda tehsil of Neelum Valley. Besides, 53 houses and 17 shops were also destroyed.[36]

Poonch and Kotli districts also face the risk of landslides at certain locations due to weak geological structures, steep slopes, and intense rainfall. Certain anthropogenic vibratory factors have altered the mountains' compaction status, rendering a great threat of land sliding to the area. Rajdhani/Khadpul landslide located near Pota Bridge on the Khadnala River on the Mirpur-Kotli road poses a severe threat to the road infrastructure and can block the access to Kotli and other areas from Mirpur for many days and thus may drastically affect the socio-economic conditions. Similarly, the Narr landslide located on Mirpur-Kotli was triggered during the 2005 earthquake and aggravated by land development for construction of the Narr road. This landslide is posing threats to road communication. The 2005 earthquake triggered these landslides, worsened by human activities mainly carried out for reconstruction and rehabilitation. For instance, widening the road from Rawalakot to Islamabad through Goin Nalla has made various locations prone to land sliding. Some examples of land sliding are on Goin Nala Road, Ali Sojal and, at Datoot.

D. Droughts, wildfires and windstorms:

All of the AJ&K, especially districts Neelum and Kotli, remained in the grip of prolonged drought between 2000 and 2004, which caused extensive damage to rain-fed crops. It also affected the orchards and livestock, which added to the economic woes of drought. The 2000-2004 drought was associated with regional climatic change processes whereby the whole region remained in the grip of the Elnino effect.[37] Drought can be expected again in district Kotli due to the extensive de-vegetation and low rainfall. Drought-related vulnerabilities are loss of livelihoods and land degradation. Loss of potable water because of drying of springs. Forest fires are becoming more common in the Neelum, Hattain Muzaffarabad and Kotli districts, with occasional reports in other districts. In May 2022, around 22 percent of the forest around Kotli was destroyed when a fire broke out for unknown reasons and quickly spread, posing a threat to human lives and wildlife.[38] Weather conditions such as droughts and winds play a great part in origination and dispersion of wild life. Sometimes, forests are set on fire by the timber mafia to justify the damage of trees, a practice which has caused enormous loss to local forests and wildlife habitats.[39]

The frequency, intensity, and impact of windstorms have increased in AJ&K in recent times. In districts Neelum and Kotli, the frequency, intensity, and impact of windstorms have increased. Most of the environmentalists term deforestation, extreme weather, and

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[36] Fahad Chaudhry, Murad Ali Khan, Syed Ali Shah, Tariq Naqash, Umar Bacha, "59 killed in Neelum Valley alone as death toll from weather- related incidents rises to 82", *Dawn*, 14 January, 2020. https://www.dawn.com/

[37] *Neelum District Disaster Risk Management Plan 2017,* p. 18.

[38] "Fire destroys 70 percent of Azad Kashmir's Kotli forests", *Daily Times*, 17 May 2022. https://dailytimes.com.pk/936373/fire-destroys-70-percent-of-azad-kashmirs-kotli-forest/

[39] Hammad Gilani, "Deforestation in AJK", https://pakobserver.net/deforestation-in-ajk-by-hammad-gilani/

temperature variations as causative factors for wind storms. The most affected communities happen to be those living in makeshift shelters in Muzaffarabad district.

III. Increased pressures on the environment and natural resources

A. Rising Population, Urbanization and Industrialisation

The rapidly growing population, urbanisation and industrialisation are causing massive environmental degradation in AJ&K. Over the last five decades (1951-1998), there has been a fourfold increase in AJ&K's population, which grew from 0.886 million to 2.9 million with an average population growth rate of over 2.9 percent. According to the 2017 census, the population was 4.045 million with a slight decline in growth rate to 1.64 percent,[40] which has grown to 4.245 million (2019 projections)- 49 percent males and 51 percent females. The rural-unban ratio is 83:17.[41] The population density is 336 persons per sq. $km^{2.}$ much higher than Pakistan's 287 persons per sq. km^{2}.[42]

Population growth is adding pressure on existing natural resources. It is resulting in rapid urbanization which in turn has led to deforestation and land degradation culminating in environmental degradation. Five cities of AJ&K- Muzaffarabad, Rawalkot, Kotli, Mirpur and Bagh have registered rapid population growth with wide-ranging consequences for environmental sustainability and contamination of water resources in the region. Waters of both rivers Jhelum and Neelum are being heavily contaminated by the residents, which causes drinking water scarcity and numerous vector-borne diseases.

Rapid Population Growth in Five Major Cities of AJ&K- 1998-2020 (in million)

	1998	2017	2020
Muzaffarabad	0.454	0.650	0.691
Poonch	0.411	0.500	0.519
Kotli	0.563	0.774	0.814
Mirpur	0.333	0.456	0.480
Bhimber	0.302	0.421	0.441

Sources: Population Census 1998, 2017; AJ&K Bureau of Statistics P&D.

Muzaffarabad is in the centre of an urban transition due to the high rate of urbanization. Its population is expected to reach 0.730 million people in 2025.[43] The population is mainly concentrated along the valley floors, on river terraces, and on areas that have gentle slopes. The rapid urbanization and unplanned growth place severe environmental pressure on the mountain's ecosystems. [44] Kotli district with the highest population in AJ&K and a density of 467 persons per sq. km is also challenged by unplanned urbanization and environmental degradation. The encroachment in Gojra Nullah from 2005 to 2022 shows that its natural drainage course has been obstructed due to encroachments impeding floods during

[40] Pakistan Bureau of Statistics, Islamabad.
[41] https://pndajk.gov.pk/uploadfiles/downloads/AJ&K%20At%20A%20Glance-2021.pdf
[42] https://www.worldometers.info/world-population/pakistan-population/. Accessed on 28 January 2023.
[43] Development Authority Muzaffarabad, https://www.dam.gok.pk/pm-message/
[44] *District Disaster Management Plan, 2017*, District Disaster Management Authority, Muzaffarabad, AJ&K. http://sdma.pk/

monsoon season. There are 66 nullahs that potentially impede natural flows due to encroachments.

Figure 1: Gojra Nullah in 2005. Source: SDMA, AJ&K.

Figure 2: Gojra Nullah in 2022. Source: SDMA, AJ&K.

Similarly, there has been rapid urban growth in Poonch, Mirpur, and Bhimber districts that has degraded the fragile eco-system of the AJ&K.

B. Deforestation and Land degradation

The rapid population growth has resulted in deforestation and land degradation. The per capita standing volume of forests in AJ&K is 299.5 cubic feet and the per capita forest area is 0.35 acre. The local communities have traditional rights in terms of use of the forests and on average 3 trees are burnt by 1 household every year for the fuel-wood requirements in the absence of alternate sources. Similarly, about 5 trees on average are required to construct a house as the wood roofs have to be replaced every 8-10 years. Deodar, Kail, Fir, and Pine are important forest tree species in AJ&K. [45] Area under forest is 11.59 percent of the total area of AJ&K. Most rural households use forests for constructing their homes, ceilings, bridges, furniture, and for fuel purposes, especially for cooking and heating.

The high population pressure on land has led to very small landholdings, ranging from 0.93 hectares in District Bagh to 3.66 hectares in District Mirpur. The average farm area per family in AJ&K is 1.76 hectares. The areas comprising slopes where grass is available are

[45] *AJK Statistical Year Book 2021*, Bureau of Statistics, P&D, Azad Govt. of the State of Jammu & Kashmir, Muzaffarabad. P.6. https://www.pndajk.gov.pk/

generally utilized for grazing cattle. The total area under cultivation in 2020 was around 196,008 hectares, about 14.7 percent of the total territory. According to the 2010 Agriculture Census, the average farm size is only 1.7 hectares. Half of it is cultivated, and a large proportion of farmland is cultivable waste, including forest, whereas per capita land holding is 1.00 hectares. [46]

From 2001 to 2021, AJ&K lost 400ha of tree cover, equivalent to a 0.16 percent decrease since 2000, and 165kt of CO_2 emission. During this period, 117ha of tree cover was lost due to fires and 282ha from all other loss drivers.[47] The peak fire season typically begins in late April and lasts around 12 weeks. In April 2015, Farhat Ali Mir, Secretary Forest, Wildlife and Fisheries, AJ&K stated: Development and commercial activities for a growing population, such as mining for minerals and construction of roads, cut deeper into the forest areas, degrading the natural green cover in the mountains of AJ&K. For 23 years after independence, trees in the territory were only cut. Not a single sapling was planted until 1970 when regeneration schemes were introduced. "Deforestation took a toll of more than 60 natural lakes in Rata Valley alone," he said.[48] Mir highlighted that "Every year the criminal activity adds 5,000 acres of barren land to the 500,000 acres already denuded of trees. Underscoring the gravity of the situation he said that trees were being cut indiscriminately for money by the mafia and for fuel by the locals, with no rejuvenation programme at present. Even trees 200 to 400 years old have been felled.[49] "In the regeneration exercises in the past, we had 57 percent success rate. That means it can take anywhere between 55 and 150 years for trees such as Conifers, Deodar, and Pines to grow back in the region." [50]

The deforestation in Neelum Valley is "unprecedented". Mir warned that if such development were not banned immediately, the area will eventually become "filthy like the Lake Saiful Maluk".[51] The growing tourism in Neelum Valley has taken a toll on the fragile environment of the valley. The rampant and unregulated construction of guest houses has led to a high demand for timber, leading to increased logging in the area.[52] The requirement for firewood has also increased manifold as tourists prefer bonfires, which consume enormous amounts of firewood. Himalayan Wildlife Foundation (HWF) Director Vaqar Zakria said the forest department was more to blame for illegal logging.[53] Loss of trees leads to soil erosion and land degradation that causes landslides, flash floods, and avalanches, eventually increasing silting in dams downstream. Soil erosion, natural disasters, and other extreme weather events also shift the tree line. Scrub trees are encroaching in Chir-pine areas. Chir pine trees are encroaching on the areas previously for blue pine trees,

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https://www.globalforestwatch.org/dashboards/country/PAK/?category=summary

46 Jamal Shahid, "Pakistan ready to save AJK forests", *Dawn* 13 April, 2015. https://www.dawn.com/news/1175576 In an interview with the author in Muzaffarabad, on 3 June, 2023 Farhat Mir strongly felt that ruthless deforestation caused by timber mafia has resulted in environmental degradation and loss of biodiversity in AJK.

47 Ibid.

48 Ibid.

49 Ibid.

50 Kalbe Ali, "Neelum Valley grapples with impact of rising tourism on forests", *Dawn*, 12 May 2019. https://www.dawn.com/news/1481697

51 Ibid. Traditionally, the local and rural community has lived in harmony with the forest, and laws that include strict penalties for stealing wood were effectively enforced under British rule. The AJ&K government has approved strict regulations on forest management.

which are encroaching on the areas for Silver fir. Deodar forests are migrating to sub-alpine areas. There is an increased incidence of invasive species and pests in the forest areas. Several indigenous plant species are being identified as endangered due to the impacts of climate change and habitat fragmentation.[54] There are also changes anticipated in wetlands and fisheries, due to changes in the hydrology and temperature of AJ&K. These climatic threats may lead to major survival concerns for the AJ&K, particularly to its water security, food security and energy security, ultimately affecting the economic security.

IV. Increased Socio-Economic Vulnerabilities and impact on conflict dynamics

Climate change is already affecting major sectors of AJ&K's economy including agriculture and livestock, trade and industry, energy, tourism besides environment, water resources, forestry, and public health.[55] The adverse impacts will undermine water, food, and energy security of the people and undermine the local economy. As this Chapter alludes to, these effects are being increasingly felt by women and vulnerable groups.

- ***Agriculture,*** primarily rainfed, is extremely vulnerable to the changing weather patterns. Climate change's effect on the hydrological cycle will negatively impact agriculture and livestock, particularly in the rainfed areas. The increases in temperature speed up crop growth and shorten the time between sowing and harvesting, which impacts the productivity of crops and fodder for livestock. In Neelum Valley, locals used to harvest many local wild vegetables from the forest, such as *wapalhak*, *sonchal* (Malva neglecta), *hund* (Taraxacum officinale), and *guchi* (Morchella esculenta), but they have also become very rare. Wild honey used to be abundant in the valley and liked by the black bears, but it has also become scarce.

- ***Hydropower generation and the tourism industry*** that are considered the backbone of the local economy will also suffer adversely.[56] Increased variability in the hydrology of rivers in AJ&K as well as the destruction of the critical infrastructure due to extreme weather events may impact production and transmission of hydroelectricity and fisheries. Climate variability, especially climate-induced disasters, is going to affect tourism and archaeological sites across AJ&K, particularly in Neelum Valley, Rawalakot, Muzaffarabad, and Mirpur districts. Floods and increased frequency of extreme events may directly impact physical infrastructure, including buildings, roads, communication services, tourism sites, landscape, archaeological and historical heritage, and tourists' arrival in the area. The health risks include direct effects of climate-induced disasters, impacts mediated via climate-related changes in ecological systems and relationships (e.g. mosquitoes and ticks), and indirect consequences relating to poverty, displacement, resource conflicts, and post-disaster mental health problems.[57] The localized epidemic

[52] *AJ&K Climate Change Policy 2017*, Climate Change Center, Planning & Development Department Azad Government of the State of Jammu & Kashmir August 2017. https://pndajk.gov.pk/ pp. 10-11.

[53] Bashir Ahmed Wani, "Climate change in mountain Valleys in Pakistan", 13 September 2016. https://www.fao.org/mountain-partnership/news/news-detail/en/c/433036/

[54] AJ&K Climate Change Policy 2017. https://pndajk.gov.pk/

episodes have increased in recent years mainly due to unavailability of safe drinking water and poor sanitation conditions.

- Climate change is likely to deepen and widen socio-economic vulnerabilities across AJ&K. As socio-economic conditions vary across different regions of AJ&K, the effects will also be varied. Some districts, like Muzaffarabad and Neelum Valley, are leading climate hotspots and have low socio-economic indicators. District Neelum is characterized by a generalized pattern of common institutional, social, and cultural vulnerabilities, which are applicable across different hazards and groups.[58] The impacts of climate change are being increasingly felt by the resident and nomadic grazier communities deriving their livelihoods from climate-sensitive fragile ecosystems in Neelum Valley. The villagers say that the snow melts in the past used to commence from 15 May onwards, but now snowmelt starts in early April, one month before the usual time. Viburnum Nervosum, locally called *Guchi*, a shrub growing vigorously in moist and dry temperate forests as an under-growth species used to flower during April but is now flowering early in January/February. Again, as per local people, frost usually started in September but has now advanced to October/November, a delay of more than one month.[59] There are some positive impacts of climate change as well. In the Neelum Valley, people believe that in the past plantation of fruit trees was not successful but in recent years they have observed that cherry plants planted ten years back have now started bearing fruits.[60] Increased temperature and reduced snowfall in upper reaches of Neelum valley has resulted in increasing opportunities for growing crops such as maize.

- ***Women*** in particular are becoming more vulnerable to the consequences of climate change which will increase gender inequality. A report recently published by Conciliation Resources and with fieldwork in AJ&K shows that on one hand, the climate crisis can shape gender and social inequality by intensifying vulnerabilities, while on the other hand gender and social inequality can shape the climate crisis by impeding the likelihood of relevant, sustainable climate action.[61] Women in AJ&K play a vital role in securing goods and income through cropping and livestock farming, working on their own and other's lands in a variety of tasks, including threshing, cleaning, drying, storing and growing vegetables and winter crops. Livestock handling is usually tasked with females, as well as grass cutting, livestock and including feeding the animals. Erratic rainfall and temperatures are likely to directly impact the women folk in the region. In addition, climate change is going to aggravate gender disparity, increase women's vulnerability, and undermine their coping capacity. Women in AJ&K will be severely impacted by growing water stress and climate-induced natural disasters. This will increase their socio-economic vulnerability and marginalisation. Currently, women's understanding and awareness

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[55] "Climate Change: Voices from Neelum Valley AJK, Pakistan", On the Frontlines of Climate Change Forum, 24 June 2009. http://www.climatefrontlines.org/sites/default/files/Pakistan_Neelum_Valley_Voices.pdf

[56] Ibid.

[57] Conciliation Resources, Gender, Cultural Identity, Conflict and Climate Change: Understanding the Relationships, Report, September 2023, https://www.c-r.org/learning-hub/gender-cultural-identity-conflict-and-climate-change

about climate change impacts are limited. They lack the preparedness to respond to natural disasters. Although the existing policy framework is gender sensitive, it recognizes women's concerns and, to some extent, gender-responsive as it tries to address gender concerns by reducing gender inequalities within communities. However, it is not gender transformative as it does not address the root causes, social norms, and practices that cause disparities and vulnerability. Further, at the institutional level, there is hardly any effort being made for gender- responsive disaster preparedness and recovery efforts. AJ&K has not yet adopted the Climate Change Gender Action Plan (ccGAP) launched by Pakistan in September 2022. Gender Action Plan builds upon five pillars: i) capacity building, knowledge-sharing, and communication, ii) gender balance and women's leadership, iii) coherence across UNFCCC and UN, iv) gender-responsive implementation and means of implementation, and v) monitoring and reporting. The ccGAP serves as a tool to strengthen gender-responsive strategies for climate action. It seeks to operationalise the commitments set out in the NCCP by ensuring that women are included in all stages of planning, development, and implementation.

- Climate change is increasing the physical, social, economic, and environmental vulnerability of AJ&K and may indirectly drive the Kashmir conflict. Climate change is likely to result in the depletion of natural resources, especially water resources, that may increase tension over water scarcity at the local and transboundary levels. This may manifest in vertical tension between local communities and high-level institutions and horizontal tensions between communities. Climate change is impacting agriculture and tourism sectors and connected livelihood opportunities, which may also increase tensions between the local communities on the one hand and the local population and government on the other. There is also growing evidence of climate-induced internal migration in areas facing severe water stress. In the surroundings of Muzaffarabad, the residents of Gojra, Thori Park, and Tariqabad, facing depletion of water resources, are migrating to other places. [62] During the fieldwork, interaction with the community including educated women, youth, media persons, professionals, and those engaged in the tourism sector it was observed that there is a lack of understanding and awareness about climate change's impacts on the ecology, and human lives. There is not much awareness within the community about the conservation of natural resources, water management, solid waste management, and pollution management.

- Climate change may be an additional conflict driver in the already divided and conflict-affected region of Kashmir. It may worsen water tension between India and Pakistan in the Indus basin, especially on the western rivers, and people in Azad Kashmir may also attribute water scarcity in their region to an overall reduction in transboundary flows. The melting of Himalayan glaciers may lead to an increased frequency of GLOFs and flash floods that transcend the line of control. In 2010, a cloud burst in Leh in Ladakh led to downstream flooding. In monsoon seasons, heavy rains in the upper reaches of the Indus basin invariably led to downstream flooding.

[58] "Negligence: Water scarcity hits Muzaffarabad", *The Express Tribune*, 15 June 2016.

2005 earthquake caused heavy damages on both sides of the line of control, prompting both sides to open up five foot-crossing points on the LoC for cooperative disaster relief. The idea of disaster diplomacy found traction in official and civil society conversations but could not materialise.

V. AJK Climate Action: Institutional and Policy Framework

AJ&K's Climate Change institutional and policy framework has evolved over the last two and half decades. It includes AJ&K Environmental Protection Act of 2000, Disaster Management Act in 2008, Climate Change Policy of 2017, State Disaster Management Authority, and Environmental Protection Agency. In addition, the AJ&K SDGs Support Unit based in the Planning and Development Department (P&D) is playing a supportive role in the implementation of the SDGs in the state. Key framework and institutions are mentioned below:

- ***AJ&K Climate Change Policy:*** National Climate Change Policy (NCCP) 2012 serves as the guiding framework for AJ&K climate actions. The policy was approved in 2017 to address climate change with sustained participation of relevant stakeholders, including government, NGOs, and the private sector. It identifies AJ&K's vulnerability to Climate Change, and its impact on different sectors of the economy and suggests adaptation and mitigation measures.[64] A Climate Change Center (CCC) established in the Planning and Development Department in 2015 was merged with the Environmental Protection Agency (EPA) in 2018. At present, the Planning and Development Department (Government of AJ&K), in collaboration with relevant line agencies, is leading efforts to develop operational and organizational structures to implement climate change strategies. The department is also working towards developing sectoral laws, policies, and institutional mandates that explain the roles and functions required for climate change response.

- ***Environmental Protection Agency:*** In June 1994 an Environment Unit was established under the Natural Resource Management Project (NRMP) in the Planning & Development Department (P&D) headed by an Environmentalist. It was followed by the AJ&K Environment Protection Ordinance in 1996, which provided for the control of pollution and preservation of the living environment, and the establishment of EPA in 1998. AJ&K Environmental Protection Act 2000 provided for the protection, conservation, rehabilitation and improvement of the environment for the prevention and control of pollution and promotion of sustainable development.[65] The Act established the Environmental Protection Agency (EPA) and AJ&K Environmental Protection Council (EPC). EPA's vision aims to protect and sustain indigenous ecosystems and biological diversity and recommends various interventions to promote green clean socio-economic development, environmental awareness raising, and capacity building of line departments. It is also responsible for implementing environmental policies, enforcing, preparing, and revising of any laws and or regulations to maintain AJ&K Environmental Quality Standards.

[59] Ibid.
[60] http://www.epaajk.gok.pk/

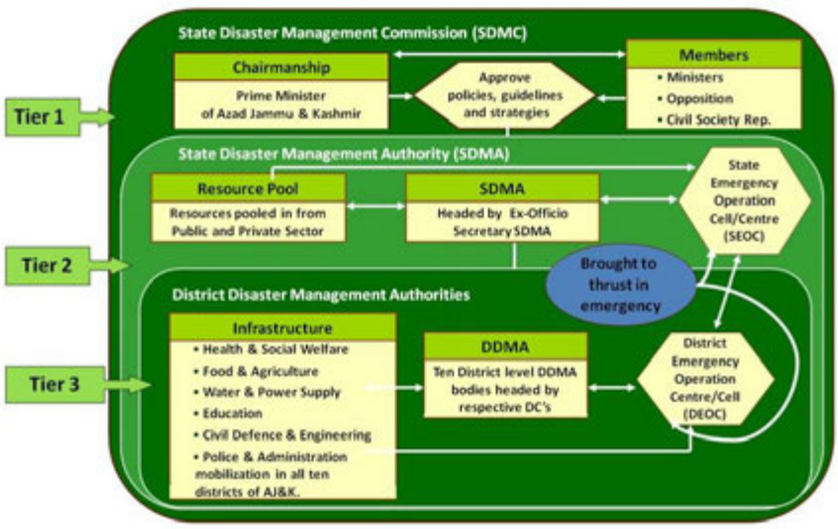
Environmental Protection Council provides for the Protection, Conservation, Rehabilitation & Improvement of the Environment and Prevention & Control of Pollution and Promotion of Sustainable Development.66 To further efforts on the environment, the Forest Department was reorganized to improve its alignment with the 2030 Agenda. The Department has prepared a Forest Policy and is developing Scientific Forest Management Plans for the rehabilitation of forests in AJ&K. Green felling has been banned in AJ&K for an additional ten years till 2027, a measure that will further improve the conditions of existing forests in the State.

- ***Disaster Management and Preparedness:*** AJ&K Institutional response to disaster management and preparedness has evolved over a long period. A reactive emergency response approach has dominated the dealing with disasters in AJ&K. In the pre-earthquake (2005) era, the Crisis Management Cell of the Ministry of Interior was given the responsibility of coordination of emergencies. The Civil Defence Organisation was Responsible for Maintaining Normal Life Activities/ its Restoration without delay if disturbed due to Enemy Action or Natural Calamities. [63]

The heavy damage caused by the 2005 earthquake forced AJ&K to initiate State-level efforts to develop a structure for disaster management focusing on prevention, mitigation, and integration of responses by conducting a review of traditional disaster management systems and policies on emergency response. The need for strong institutional and policy arrangements was fulfilled with the promulgation of the State Disaster Management Ordinance, 2007, which became the State Disaster Management Act in 2008. The State Disaster Management Commission (SDMC) has been established under the Chairmanship of the Prime Minister of AJ&K as the highest policy-making body in disaster management. As an executive arm of the SDMC, the State Disaster Management Authority (SDMA) has been made operational to coordinate and monitor the implementation of State Policies and Strategies on disaster management Authorities (DDMAs) have been established in all ten districts.[68] SDMA works with government departments both at federal and State levels, the armed forces, UN agencies, and development partners to mobilise, receive, and deploy relief goods and also to devise proactive disaster response plans. SDMA has responded to 2009, 2010, 2011, and 2012 floods in AJ&K.

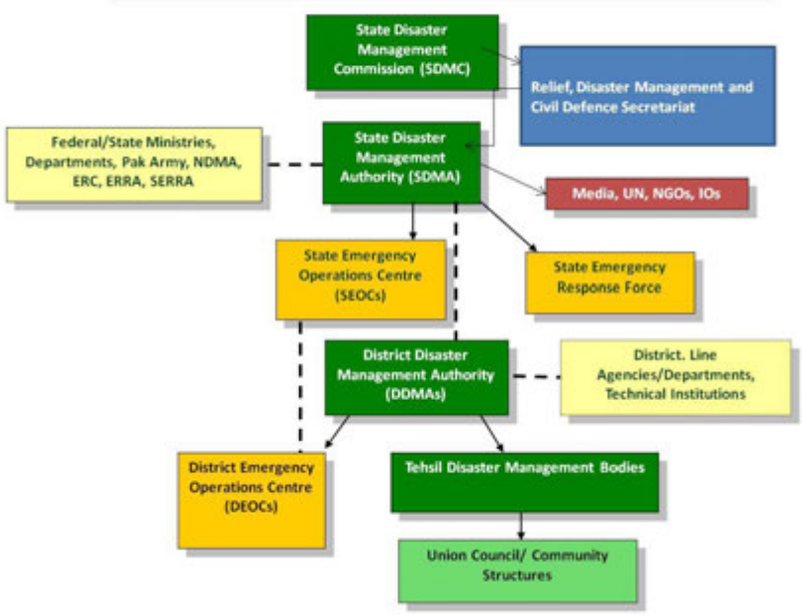
[61] State DRM Plan AJK. p. 46.
[62] State DRM Plan AJK.

Operative Framework



Source: State Disaster Management Authority (SDMA), AJ&K.

Coordination Framework



Source: State Disaster Management Authority (SDMA), AJ&K.

Currently, there exists a knowledge gap in understanding DRR within the community and across different sectors of the government which needs to be bridged. In addition, there is need to move away from a disaster management approach which is more reactive to a disaster risk reduction approach which is more proactive by increasing the sustained adaptive capacity of the key local institutions and communities. Further, at the institutional level, there is a lack of focus on building their adaptive capacity: a) organizational performance and capabilities, b) addressing organizations' ability to adapt to change and, c)

promoting cooperation between organizations, institutions, and sectors. [64] This badly affects their coping capacity in responding to the climate-induced disasters.

- ***State Institute of Disaster Management:*** The AJ&K Disaster Management Act 2008, envisaged the establishment of the State Institute of Disaster Management (SIDM) which shall primarily be responsible for planning and promoting training, research and developing core competencies in the area of disaster risk management, documentation, and development of state-level information base, relating to disaster management policies, prevention mechanisms, and mitigation measures. It also envisaged the establishment of the State Disaster Management Fund (SDMP). While SIDM has not been established as yet, the SDMP is functioning.

- ***AJ&K SDGs Support Unit:*** The Government of AJ&K, with the technical support of the Ministry of Planning, Development & Reform and the United Nations Development Programme, has established the SDGs Support Unit at P&D that includes SDG 13 on Climate Action. The function of the SDGs Support Unit is to help align all policies and actions of the AJ&K government with SDGs and to coordinate and track efforts throughout the State. The AJ&K has not yet conducted a financial gap analysis to explore the level of funding required to achieve the SDG targets. AJ&K Voluntary National Review (VNR) Report 2019 and Mapping the Annual Development Programmes 2016-17 to 2020-21 with the SDGs have assessed the progress and resource allocation for SDG 13 on Climate Action. Allocations made to schemes associated with climate action have seen a sustained rise from FY 2016-17 to FY 2019- 20, indicating an over 20 times increase in annual budgets – from Rs. 50.000 million in FY 2016-17 to Rs. 1,065.000 million in FY 2019-20. However, for FY 2020-21, there has been a substantial reduction in allocations to the programmes and projects on climate change, with allotments of Rs. 84.968 million. Goal 13 stands in 10th place (Rs. 2,329.968 million) in terms of total allocations over the last five years.[65] This is partly due to resource constraints and also due to the lack of capacity of various departments to utilise funds.

While there have been efforts made to develop climate response and carve out institutions to deal with the emerging climatic threats, a sectoral approach is dominating the climate action. There is no agency which is exclusively responsible for the management of rivers, lakes, and glaciers. Different agencies are performing different functions related to the water resources. Watershed management is carried out by the Forest Department; irrigation is under the Agriculture Department while AJ&K Private Power Cell accords approval for construction of hydel power stations. The EPA reviews the EIA reports and regulates the enforcement of environmental regulations. Fisheries affairs are managed by the Fisheries Department.[66] There is also a lack of coordination between different departments which weakens the coping capacity of the AJ&K government.

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[63] "Capacity building at systemic, institutional and individual levels", https://unfccc.int/capacity-building%20levels

[64] *Mapping the Annual Development Programmes 2016-17 to 2020-21 with the SDGs,* AJK&K SDGs Support Unit, Planning and Development Department, Govt of AJ&K, April 2021. P.21. https://www.sdgpakistan.pk/uploads/pub/SDG_AJK_Title_Final_20-5-2021.pdf

Shafiq Abbasi, Director Environment, *State of Environment AJK, 2018*.

VI. Towards a Climate Resilient AJ&K

AJ&K is increasingly facing climatic threats to its fragile eco-system that provides sustenance to its rapidly growing population. Increased environmental degradation and climate-induced disasters are likely to impact water, food, energy security, and its nascent tourism industry in the region that will substantively constrain livelihood opportunities for the local population. Already under the shadow of conflict, the region is lagging in socio-economic development indicators that may get aggravated by climate stressors. To reduce vulnerability to climate change, AJ&K needs to develop the climate resilience of its infrastructure and communities, reduce policy and coordination gaps, and build the institutional capacity of EPA and SDMA in particular.

- ***Mainstreaming of Climate Change in planning and policy processes & reducing policy and coordination gaps:*** There is a strong need to adopt a cross-sectoral approach to mainstreaming climate change and developing inter-departmental coordination. The sectoral approach at the policy level and lack of interdepartmental coordination are not only hampering the government's understanding of the scale and gravity of the impact of climate change but also the effectiveness of its response.

- ***Building early warning mechanisms:*** There is an urgent need to improve weather information broadcasting and communication systems across AJ&K. The region suffers from inadequate flood early warning arrangements that cause both human and material losses; especially in more vulnerable districts i.e., Neelum and Muzaffarabad. Thus, there is a great need to have radar coverage that can give empirical data of AJ&K. In a positive development, the updated National Flood Protection Plan-IV has prioritised improvement in Flood Forecasting & Early Warning System across the country. This envisages the establishment of six Regional Flood Forecasting & Ear Early Warning System by PMD including one in Muzaffarabad. This will however take several years to complete, leaving communities without a well-functioning EWS in the short term.

- ***Conducting Multi-Hazard, Vulnerability and Risk Assessment (MHVRA)[72] & Building Climate Resilient Infrastructure:*** For an effective response, it is crucial to have a district level multi-hazard vulnerability risk assessment. In addition, there is a need to undertake hazard and risk mapping of existing infrastructure for telecommunication, power, transport, hydraulic, and sanitation; increase the resilience of infrastructure against climate change impacts and climate-related hazards; and incorporate climate change impact projections into infrastructure planning.

- There is a need to undertake GIS mapping of all existing flood protection infrastructure especially flood embankments for efficient monitoring and flood management. Unregulated encroachments in rivers the course and *nalas* should be

65 Multi-hazard vulnerability risk assessment is a comprehensive analytical tool which intends to assess the degree of the vulnerability exposure and risk of study area to multiple impending hazards.

removed to allow natural flows in the rivers and streams. Nature-based solutions in slope stabilisation should be prioritised.

- ***Understanding Disaster Risk Reduction***: The AJ&K is likely to face more climate-induced extreme events such as flash floods, mudslides, landslides, and avalanches in future. The understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment is essential for disaster risk management. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness, and response.

- ***Building Institutional capacity of SDMA and EPA:*** AJ&K needs to build its adaptation capacity at all levels- individual, institutional, and systemic. Within this context, at the institutional level, there is an urgent need to develop the adaptive capacity of the State Disaster Management Authority and Environmental Protection Agency of AJ&K. Extensive discussion with the officials from both departments revealed that there is a great need to strengthen their coping capacity by enhancing their technical, human and financial resources and enhance interdepartmental coordination.

- ***Developing & Sustaining Adaptive Capacity of Communities & Local Government:*** There is a need to change the attitude and behaviour of the community by creating awareness and developing a culture of disaster prevention and resilience amongst them through dissemination of information on hazards, and vulnerabilities and building their adaptive capacities. Enhanced use of the media, IT APPs and inclusion of climate change and DRR in the curriculum of academic institutions from primary to university levels imparting skills and conducting disaster drills regularly can help in creating awareness and preparedness on climate change impacts. Integrated waste management measures can create a better environment to support eco-tourism.

- ***Gender Mainstreaming in Climate Change & Disaster Management Responses:*** Women stand on the frontline of climate change. Their resilience to bear its impacts may be limited, but it can be built if an integrated approach to adapt and mitigate climate change is adopted. This calls for integrating an intersectional gendered analysis into climate change programming, policy development and advocacy. An intersectional approach can help ensure initiatives meet diverse community priorities while guiding entry points for influencing different actors' response strategies.

- ***AJ&K should adopt ccGAP as early as possible*** as it will help in building the knowledge and capacities of women and integrate them in some of the key priority areas: disaster risk reduction, agriculture and food security, forests and biodiversity, and water and sanitation. In addition, the government has adopted Sendai Framework for Disaster Reduction (2015-2030) which strongly prioritizes gender-inclusive disaster risk management and recovery efforts. Thereby, the AJ&K government should effectively strategize on gender inclusive climate resilience and activate gender and child cell that was functional with the support of UN Women in the past.

- ***Transboundary Cooperation in Disaster Risk Management:*** Climate Changes does not recognise boundaries. In view of increased frequency and magnitude of flash floods and other extreme events due to changing climate conditions, both sides (in the case of AJ&K – India and Pakistan) need to develop transboundary cooperation in disaster risk management. Within this context, coordination in the installation of early warning systems and information sharing regarding weather forecasting and flood forecasting can ensure climate security for both sides.

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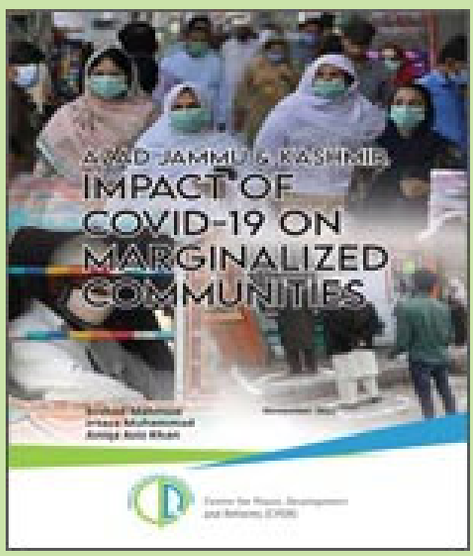

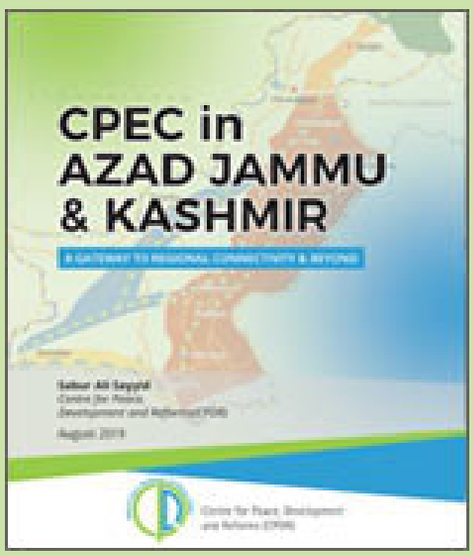

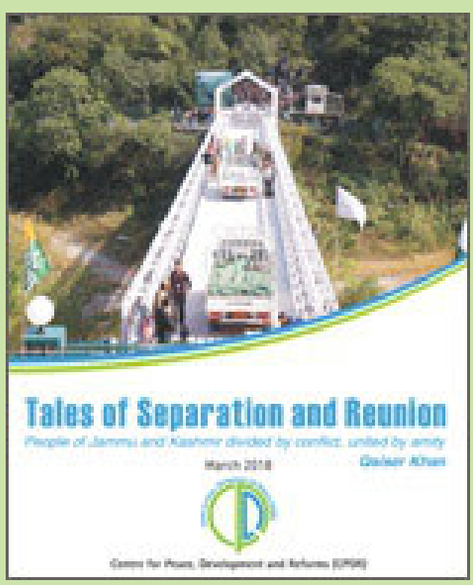

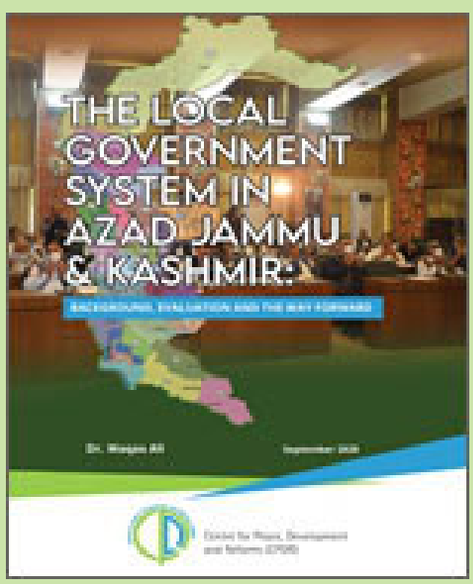

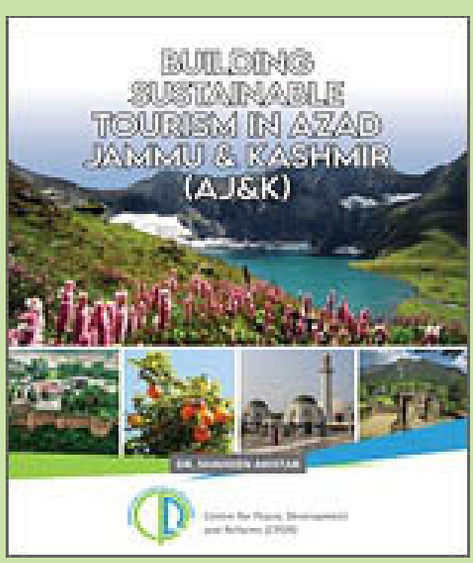

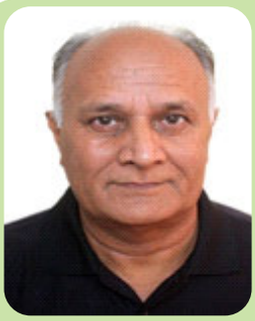

Ch. Ghulam Rasul
Former Director General Pakistan Meteorological Department,
Head Climate Change Program IUCN Pakistan

The report titled “Climate Risk Management in Azad Jammu & Kashmir” written by Dr. Shaheen Akhtar of National Defence University, Islamabad included wide ranging evidence of climate indicators impacting climate change. Kashmir shares the cryospheric assets of the Himalayas which are receding rapidly due to global warming and producing increased number of glacial lakes posing serious threats of outburst to vulnerable population resulting into highly variable river flows. She has nicely explained the impact of global warming on the water cycle of this mountainous region and increasing frequency and intensity of the extreme hydrometeorological events predicted in IPCC 6AR. Monsoon is getting stronger and highly variable over time and space resulting into frequent floods and drought. Dr. Shaheen has held responsible the enthropogenic factors such as increasing population, urbanization, pollution, encroachment of water ways and the land use change triggering the climate change crisis. In mountainous region of Kashmir, the density of monitoring network and early warning systems generating alerts to the local population and authorities are not up to the mark therefore uninformed happenings increase the casualities. At the same time people centered approaches especially women empowerment can increase the public awareness and confidence to develop climate resilient communities. Dr. Shaheen has dispensed the climate crisis management approaches through detailed analyses of present and future vulnerabilities focusing on science-policy-action nexus. I appreciate Dr. Shaheen Akhtar, a promising scientist and academician, to produce a comprehensive report on the climate crisis management of Kashmir Region which is first of its kind and will serve as the living document for planners, policy makers and young researchers.

Syed Shahid Kazmi
Country Coordinator
Pakistan Humanitarian Forum (PHF)
INGOs forum Pakistan

"I commend Dr. Shaheen's pioneering research on climate risk management in Azad Jammu & Kashmir, which offers critical insights and solutions to the pressing challenges of climate change in the region. Her work significantly aligns with my own efforts and engagements in climate change advocacy, both locally and globally. Collaborating with diverse stakeholders, this research marks a vital step towards sustainable environmental strategies and policies. I fully endorse this study for its contribution to our collective understanding and action against climate change."Syed Shahid Kazmi Country Coordinator Pakistan Humanitarian Forum (PHF) INGOs forum Pakistan.

About the Author

Specializes in the field of regional stability, Climate Change conflict resolution and peace building in South Asia.

Dr Shaheen Akhtar has been extensively working on the traditional and non traditional security issues in the region including tourism, gender, water, energy and climate change. She is recipient of several Fellowships including Common wealth Professional Fellowship on Tourism and peace building (2014) and Women in conflict 1325 Fellowship by beyond Border Scotland (2018).

It is my privilege to introduce this seminal research report titled "Climate Risk Management in Azad Jammu and Kashmir (AJK)" authored by Prof. Dr. Shaheen Akhtar.In recent years, the discourse surrounding climate change has grown increasingly urgent, and its impact on vulnerable regions like AJK cannot be overstated. This comprehensive study delves deep into the complex interplay between climate dynamics and the socio-economic fabric of AJK, offering invaluable insights into the challenges faced by its communities.

It is imperative that we prioritize resilience-building-measures, foster sustainable development, and enhance disaster preparedness to mitigate the adverse effects of climate change on AJ&K I invite policymakers, academics, and stakeholders to heed the insights presented in this report and join hands in crafting resilient strategies to safeguard the future of AJK.

Zulfiqar Abbasi - President CPDR

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