
Chapter 17

Climate Change

Climate change is one of the most significant environmental challenges facing the world. Greenhouse gas (GHG) emissions resulting from human activities, particularly fossil fuel consumption and deforestation, have increased the concentration of these gases in the atmosphere, leading to irreversible damage to natural resources and ecosystems. Climate change is expected to devastate the world's poor, as they are both geographically and economically vulnerable, making it more difficult for them to adapt. Despite contributing the least to the problem, developing countries are expected to bear the brunt of the impact of climate change.

Despite accounting for only 0.9 percent of global greenhouse gas (GHG) emissions, Pakistan is one of the world's most vulnerable nations to the impacts of climate change. The country faces unpredictable weather patterns, resulting in flash floods, droughts, glacial lake outbursts, intense heat waves, and erratic rainfall. As a result, its ecosystems and landscapes are deteriorating. Forest fires are increasing, plant and animal species are migrating, and water bodies and wells are depleting due to intensified human activities. In addition, rising sea levels and more intense storms could lead to coastal flooding and erosion, causing the loss of crucial coastal habitats such as mangroves, which serve as important nurseries for many fish species. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) suggests that climate change will likely worsen the frequency and intensity of such extreme events.

The government has developed a comprehensive strategy called the 4RF (Resilient, Recovery, Rehabilitation, and Reconstruction Framework) to ensure a resilient recovery from natural disasters. The aim is to reduce the adverse impacts of climate change and natural hazards on Pakistan's economy, particularly the agriculture sector and population.

17.1 Natural Disaster Events in Pakistan¹

The frequency of climate-related natural disasters has alarmingly risen in Pakistan (Figure 1). The most observed hazardous phenomena in Pakistan during 1980-2022 were floods, tropical cyclones, extreme temperatures, and occasional droughts. The floods of 2010 and 2022 and the earthquake of 2005 created substantial economic losses, casualties, infrastructure damages, and rehabilitation costs. It has been observed that the intensity of floods has been increasing over the years, which can be attributed to changes in global climate patterns (rising temperature and changing precipitation patterns), melting glaciers, deforestation, and urbanization.

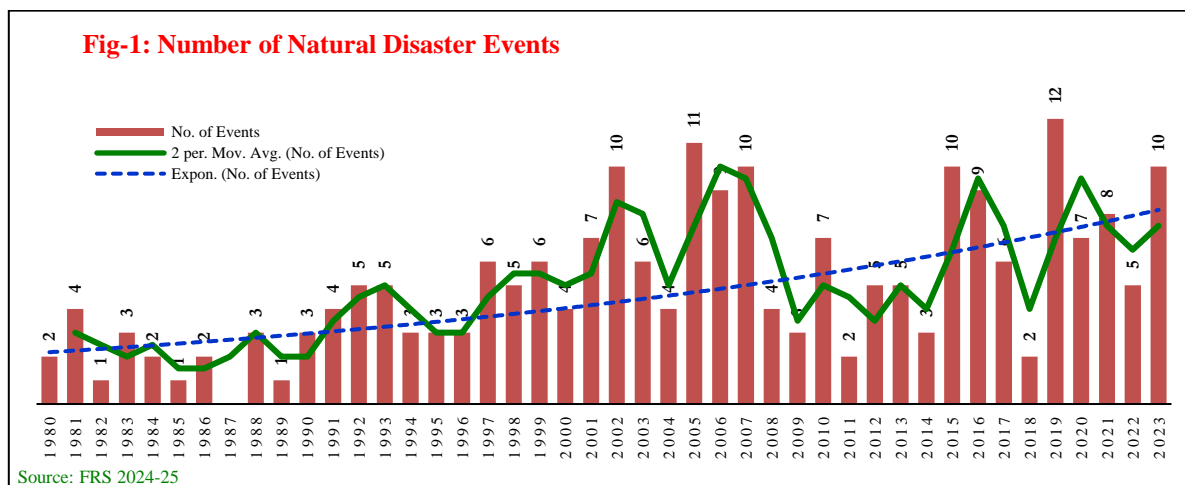
Climate change leads to prolonged droughts in specific regions of Pakistan. In 2018, insufficient rainfall and extended water scarcity caused drought conditions in Balochistan and Sindh. In September of that year, the Sindh government declared significant portions of Southern Sindh as "calamity areas" due to deficient rainfall during the monsoon season. Unlike other natural disasters, droughts build up gradually over time, and their impacts can persist for several years after they occur.

The 2022 floods have revealed Pakistan's high

¹ Fiscal Risk Statement 2024-25

vulnerability to climate change. The disaster has highlighted the vulnerability of the country's people, with one-third of the country being submerged and 33 million people affected. Nearly 8 million people were reportedly displaced. The scale of the disaster was

unprecedented in Pakistan, surpassing the damage caused by the 2010 floods. The estimated damage was US\$14.9 billion, the loss to the GDP was US\$15.2 billion, and the total rehabilitation need was estimated at US\$16.3 billion.



These floods have caused the most damage to the housing sector, which incurred losses of US\$ 5.6 billion. The agriculture, food, livestock, and fisheries sectors suffered losses worth US\$ 3.7 billion, while transport and communications suffered losses worth US\$ 3.3 billion. The transport and communication sector has the highest reconstruction and recovery needs, estimated at US\$ 5.0 billion, followed by agriculture, food, livestock, and fisheries at US\$ 4.0 billion, and housing at US\$ 2.8 billion.

In 2010, Pakistan experienced extraordinary rainfall, resulting in unprecedented floods affecting the country. The rains/floods of 2010 affected over 20 million people. Additionally, flash floods and landslides triggered by the rain caused severe damage to infrastructure in the affected areas.

The Preliminary Damage and Need Assessment Report on Pakistan Floods 2010 presented estimates for direct damage and indirect losses, estimated at approximately Rs 855 billion; there construction cost ranges from Rs 578 billion to 758 billion. The direct damage caused by the floods was estimated at Rs 552 billion (US\$ 6.5 billion), while indirect losses amounted to Rs 303 billion (US\$ 3.6 billion). The agriculture, livestock, and fisheries sectors suffered the

highest damages, estimated at Rs 429 billion (US\$ 5.0 billion). The report on Floods 2010 also provided a detailed breakdown of the damage costs. Total reconstruction cost is provided across three options, with option one as the base case and option three as the recommended option. The reconstruction cost for the base case is estimated at Rs 578 billion (US\$ 6.8 billion), while the recommended option costs are estimated at Rs 758 billion (US\$ 8.9 billion).

The impacts of natural disasters, especially floods, extend beyond immediate casualties to include long-term socio-economic repercussions. The data show loss of life and displacement of communities, with thousands of deaths and millions affected by flood events. Moreover, as the substantial damages indicate, the economic toll underscores the strain on national resources for disaster response, recovery, and rebuilding efforts.

Climate change exacerbates Pakistan's vulnerability to floods by altering precipitation patterns, intensifying extreme weather events, and increasing the frequency and severity of floods. Rising global temperatures contribute to melting glaciers and increased water runoff, further exacerbating flood risks, particularly in

mountainous regions. Additionally, changing weather patterns can lead to unpredictable monsoon rains, amplifying the likelihood of flash floods and riverine inundation.

17.2 Climate Mitigation and Adaptation Plans in Pakistan

In the face of global climate challenges, Pakistan emerges as a nation grappling with the disproportionate impact of climate change despite its relatively minor contribution to global greenhouse gas emissions. The average temperature in Pakistan has increased by 1°C since the 1980s and is projected to continue rising. Climate change has significantly affected the Indus River Delta, situated at the confluence of the Indus River and the Arabian Sea. With increased temperatures and rising temperature volatility, Pakistan will see increased climate-related severities in the future. The most serious effects of climate change in Pakistan are expected to increase severe drought and volatility in extreme precipitation events, leading to more mudslides and landslides.

Beyond its NDCs, Pakistan has exceeded mitigation efforts, resulting in an 8.7 percent reduction in emissions between 2016 and 2018. The government, adhering to the GHG emissions trajectory outlined in Pakistan's NDCs 2016, aims to limit emissions to 1,603 million tonnes of carbon dioxide equivalent (Mt CO₂e) by 2030. Pakistan also aims to shift to 60 percent renewable energy and 30 percent electric vehicles by 2030 and altogether ban imported coal.

Pakistan, recognizing the role of nature in climate adaptation and mitigation, has developed robust natural capital restoration efforts, including the Green Pakistan-Upscaling and Protected Areas Initiative (PAI). These programmes have also enhanced livelihood opportunities for the most vulnerable, including women and youth. In addition, Pakistan has introduced several policy actions focused on mitigating greenhouse gas emissions from high-emission sectors like energy and industry.

Pollution in Pakistan

Pakistan is grappling with air pollution crisis,

with some urban areas experiencing hazardous levels of pollution throughout the year. Children are susceptible to air and water pollutants, which can have lifetime consequences in terms of diseases, disability, cognitive impairment, and death. Pakistan's PM_{2.5} concentration levels, which on average are estimated at 49.5 micrograms per cubic meter (µg/m³), five times higher than the WHO's recommended limits, pose a severe health hazard. Over a million citizens are at increased mortality risk from air pollution in highly urbanized cities, especially Lahore, Karachi, and Peshawar. The primary sources include the domestic use of fossil fuels (necessitated by inadequate access to clean, modern energy for cooking), motor vehicle emissions, industrial emissions, and emissions from agriculture, including fertilizers, livestock, and the burning of crop residues.

The Government of Pakistan has formulated a strategy to tackle climate change challenges, incorporating significant policy interventions and climate-related measures. The essential measures are as follows:

i. National Clean Air Policy (NCAP)

In Pakistan, air pollution levels have escalated significantly, with some urban regions reaching hazardous pollution levels. In 2019, Lahore experienced ambient Particulate Matter (PM_{2.5}) concentrations as high as 123 µg m⁻³, 24 times greater than the Air Quality Guideline set by the World Health Organization (WHO). To address this issue, the Ministry of Climate Change & Environmental Coordination (MoCC&EC) formulated and introduced the NCAP in 2023, aiming to enhance air quality by reducing pollution nationwide. The NCAP serves as a blueprint for improving air quality throughout Pakistan, focusing primarily on actions at the national level. Additionally, the provinces of Pakistan play a vital role in implementing measures to enhance air quality within their respective jurisdictions.

ii. Pakistan Clean Air Action Plan

Clean Air Asia and the Stockholm Environment Institute, supported by the Climate and Clean Air Coalition, provide technical support to the

provincial administrations of Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa in developing Clean Air Action Plans (CAAPs). Assessments are currently being conducted to mitigate air pollution, aiming to identify the sources of pollution in these provinces and

assess the potential reduction achievable through different measures.

Artificial rain has been used for the first time in Pakistan to combat hazardous pollution levels in Lahore. The detail of cloud seeding is given in the Box-1

Box-1: Smog & Cloud seeding

Smog, a harmful mixture of fog and smoke, has become a recurring phenomenon during winter, engulfing the city in a thick blanket of toxic air. The combination of vehicular emissions, industrial pollution, agricultural burning, and adverse weather conditions primarily causes smog. During the winter, a temperature inversion phenomenon traps pollutants close to the ground, leading to a sharp increase in particulate matter (PM_{2.5} and PM₁₀) and harmful gases in the air.

Punjab Province, especially District Lahore, experiences severe smog every winter, leading to hazardous air quality and health problems for residents. Traditional methods like industrial closures and traffic restrictions have limited effectiveness. Cloud seeding, also known as artificial rain, is an emerging technology in some countries that induces rainfall and clears pollutants from the air.

Pakistan's first Artificial Rain through Cloud Seeding was conducted successfully on 16.12.2023 in collaboration with UAE's National Center of Metrology (NCM) experts to combat hazardous pollution levels in Lahore. To achieve self-sufficiency, the Strategic Plans Division (SPD) was actively developing indigenous Cloud Seeding technology and submitted a proposal of Rs.247 million for this purpose in FY2024 and a subsequent budget of Rs.200 million in FY2025. This initiative aims to eliminate Pakistan's dependence on foreign assistance to mitigate air pollution. The technology is expected to be operational before the upcoming smog season, enabling its implementation in collaboration with relevant government departments.

Source: Environment Protection Department Punjab

iii. Pakistan Policy Guidelines for Trading in Carbon Markets

The guideline envisages carbon markets as instrumental in mobilizing private sector finance, encouraging investment in sustainable projects, and expediting the shift towards a low-emission economy. It emphasizes that the policy will undergo biennial reviews to incorporate improvements based on lessons learned, changes in international standards, and best practices. This policy addresses the governance and regulatory framework for compliance and Voluntary Carbon Markets (VCM) in Pakistan, per Article 6 of the Paris Agreement.

iv. National Electric Vehicle (NEV) Policy

The National Energy Efficiency and Conservation Authority (NEECA) has collaborated with the United Nations Development Programme (UNDP) to develop the Electric Vehicle (EV) Charging Infrastructure Regulations 2023. These regulations are in the final stages of approval,

and the purpose of these regulations is to promote and facilitate the adoption of electric vehicles, expedite the establishment of a convenient and cost-effective EV charging infrastructure across Pakistan, and set minimum requirements for such infrastructure to meet both short-term and long-term charging needs.

v. Nationally Determined Contributions

Pakistan's updated Nationally Determined Contributions (NDCs) target a 50 percent reduction in the country's projected greenhouse gas emissions by 2030. This target is based on financing a 15 percent reduction below the business as usual (BAU) levels through domestic resources while reducing an additional 35 percent subject to the provision of international grant finance that would require USD 101 billion just for the energy transition.

The MoCC&EC has launched federal and provincial NDC implementation plans to bolster the environment by establishing policies, regulations, and institutional frameworks to

tackle implementation challenges and barriers. They also aim to pinpoint potential funding sources and develop Monitoring, Reporting, and Verification (MRV) mechanisms across all economic sectors to ensure NDC implementation. Moreover, efforts are underway to devise a financial investment plan and raise stakeholder awareness regarding the necessary actions to achieve NDC targets.

vi. Climate Finance Wing

Climate Finance Wing has two units, one dealing with Carbon Trading and the other facilitating access to private and global climate finance. A dashboard has also been prepared to coordinate with all the development partners to attract global climate finance through the different projects related to climate change. The Global Environment Facility (GEF) and Green Climate Fund (GCF) Steering Committees of Pakistan are actively reviewing and submitting various funding proposals related to climate finance. Climate Finance Strategy would be a comprehensive document covering access to all types of climate finance. These initiatives are expected to gain momentum gradually, and Pakistan will be able to capture a significant amount of financing to address its climate change challenges.

vii. Climate Budget Tagging Initiative

MoCC&EC will coordinate the budget tagging exercise with the MoF and other relevant stakeholders to identify government budgets allocated to climate-related activities. This will help the Government to identify its climate-related investments instantly. Due to the strong linkage between climate and disaster and its effects on women, the exercise will include climate, disaster, and gender tagging. The exercise will encompass all federal government ministries' current and development budgets and expenditures.

viii. Living Indus Initiative

The Government has launched the Living River initiative to restore the River Indus for a climate-resilient future. The Living Indus initiative seeks to rehabilitate and revive the natural resources and ecosystems of the basin to ensure their resilience to climate change. This landmark,

Pakistan's Living Indus Initiative, was bestowed the title of World Restoration Flagship by the United Nations. Selected from 150 applicants and supported by over 70 governments, its efforts to restore the Indus River basin have garnered global recognition.

17.3 National Adaptation Plan 2023 for Climate Change

Climate change is a long-term challenge, and effective adaptation requires strategic planning that considers the needs of both current and future generations. The Pakistan National Adaptation Plan (NAP) provides a framework for implementing adaptation, promoting inclusivity, and facilitating stakeholder collaboration. It also serves as an effective tool for climate finance mobilization.

Projected Climate change trends given in NAP 2023 are as follows:

- Pakistan's projected temperature increase is expected to exceed the global average. Temperature increases of 1.4°–3.7°C are projected by the 2060s and increases of 6.0°C by the 2090s
- Mean annual precipitation changes are uncertain, with projected monthly rainfall changes ranging from a decrease of 20 percent to an increase of 41 percent by the 2090s. While significant uncertainties remain, climate models point to increased rainfall from January to June and a decrease from July to September, along with an increasing trend in rainfall over the Upper Indus Basin and a decreasing trend in the Lower Indus Basin.
- It is projected that water availability per capita will decrease to an alarmingly low level by 2025. Yields of major crops such as wheat and rice are expected to decline significantly.
- Sea levels are forecast to increase by 30–80 cm by 2100. The low-lying coastal regions of Pakistan, including the city of Karachi, are at significant risk from projected sea-level rise. As the sea level rises, seawater is causing further intrusion into the Indus Delta, affecting the freshwater sources and

overall ecological balance.

- Higher frequency and intensity of extreme weather and climate events, such as cyclones, floods, and droughts, are expected. Projected decreases in glacier volume and snow cover will lead to alterations in the seasonal flow pattern of the Indus River System and an increase in the formation and outburst of glacial lakes.

Climate Change Impacts

- The annual expected damage from riverine floods by 2050 is projected to surge by 47 percent (RCP 4.5) and 49 percent (RCP 8.5), respectively.
- The fraction of the population exposed to heatwaves yearly is expected to increase by 32 percent (RCP 4.5) and 36 percent (RCP 8.5) by 2050, respectively.
- Labour productivity is projected to decline across the board because of escalating heat stress—by 7 percent (RCP 4.5) and 10 percent (RCP 8.5), respectively.
- Climate change will likely severely impact the agriculture sector, increasing food production and access pressure. For example, by 2050, the annual mean wheat yield will decline by 1 percent (RCP 4.5) and 2.5 percent (RCP 8.5), respectively.
- Precipitation changes and declining water availability could damage riverine ecology, impair water security, and affect hydropower production.
- Sea-level rise will contribute to the further salinization of soils and coastal erosion, and inundation will harm fisheries and aquaculture.
- Air and water pollution will aggravate human health, especially those living in vulnerable areas.

i. Advancing National Adaptation Plan Process in Pakistan

The project "Enhancing Capacity to Advance the National Adaptation Plan Process in Pakistan" is funded by the GCF with the objectives to (a) reduce vulnerability to the adverse impacts of climate change by enhancing adaptive capacity

and resilience and (b) Facilitate the coherent integration of climate change adaptation into relevant new and existing policies, programmes, and activities, particularly within development processes and strategies across various sectors and levels. The project;

- Provided technical and financial assistance for the finalization and printing of the NAP document in 2023
- Researched, reviewed, and synthesized available information on the adverse effects of climate change and effective coping strategies and produced a report on Pakistan's Climate Change Impact Storylines based on existing vulnerability literature
- Generated a report outlining gaps and proposing changes to the current Policy and Legal Framework on climate change adaptation
- Conducted a mapping exercise to identify potential partnerships for the NAP Project and Organized a high-level consultative workshop to establish a roadmap for NAP process implementation, with participation from 100 stakeholders and
- Initiated work on developing project proposals for the Living Indus Initiative in Pakistan, funded through GCF financing.

ii. Adaptation Fund Project–Engagement with UN-Habitat

MoCC&EC, in collaboration with UN-Habitat, is executing a project titled "Enhancing Community, Local, and National-Level Urban Climate Change Resilience to Water Scarcity Caused by Floods and Droughts in Rawalpindi and Nowshera Districts," with a total budget of US\$ 6.0 million. The primary aim is to fortify urban resilience against water scarcity resulting from floods and droughts. This overarching objective will be realized through various sub-objectives: Firstly, at the community level, the project aims to upgrade flood-resilient water harvesting facilities at households and enhance capacities for planning, constructing, and maintaining these. Secondly, at the district/city level, the focus is on improving water harvesting infrastructure in public buildings and gardens

while developing spatial strategies to assess and manage climate change-related risks. Lastly, at the national and provincial levels, efforts will concentrate on enhancing the capacity to guide urban development considering climate change and disaster risks, particularly addressing water scarcity from floods and droughts.

iii. Climate Change Dashboard Development

Pakistan reached a significant milestone with the launch of the Climate Change Dashboard, a comprehensive platform that includes modules for climate data tools and tracking NDCs achievements. This initiative plays a vital role in enhancing resilience against the impacts of climate change.

iv. Strengthening Adaptation and Resilience – A programme of GIZ

The "Strengthening Climate Adaptation and Resilience (SAR)" project assists in the planning cycle of climate change adaptation measures, from conducting climate risk assessments to testing financing approaches and instruments. Under the SAR project, GIZ has provided financial support of up to 10 million euros in grants to create an enabling environment and pave the way for implementing climate resilience and adaptation initiatives in Pakistan. The programme aims to enhance prerequisites for climate change adaptation and risk management, specifically focusing on improving conditions for women and vulnerable communities in selected provinces and at the national level.

v. National Hazardous Waste Management Policy (NHWMP)

An Action Plan for implementing NHWMP 2022 was prepared in July 2023. The action plan targets were derived from the objectives of the NHWMP, 2022. This action plan sets out the priorities regarding targets and actions to be pursued over the next three years. The targets would be achieved within its lifetime to strengthen the protection of the environment and human health by implementing best practices in the management of hazardous waste in Pakistan

vi. Mainstreaming Climate Change Adaptation through Water Resource Management in Leather Industrial Zone Development.

The project, amounting to US\$ 3.3 million from a GEF grant implemented in Sialkot, Punjab, aims to reduce vulnerability and build resilience by integrating climate change adaptation into urban development. It also seeks to develop the capacity of the targeted communities and leather business owners. The Sialkot district and Sialkot urban plan implementation, dissemination of information, demonstration of safe, affordable, and advanced technology for water treatment, and water conservation in the pilot Sialkot Tannery zone are essential initiatives under the project.

vii. The United Nations Climate Change Conference (COP28)

The 2023 United Nations Climate Change Conference convened from November 30th to December 13th, 2023, in Dubai, United Arab Emirates (UAE). Negotiations during the two-week conference proved challenging, particularly concerning central outcomes such as the inaugural Global Stocktake (GST), implementing the Global Goal on Adaptation (GGA), the mitigation work programme, just transition pathways, and matters related to Paris Agreement Article 2.1(c). Pakistan is actively engaged as a responsible member of the global community and is dedicated to upholding the principles outlined in the UN Framework Convention on Climate Change (UNFCCC). As a developing nation and a Non-Annex I Party to the UNFCCC and the Kyoto Protocol, Pakistan committed to the principles of "Common but Differentiated Responsibilities (CBDR)." Additionally, Pakistan diligently fulfills its obligations as a party to the Paris Agreement. In pursuit of its goals, Pakistan collaborates with Like-Minded Developing Countries (LMDC) and is a member of the G-77 & China alliance. Pakistan played a significant role in the COP 28 process and achieved several milestones, including:

- Contributing to the adoption of the first-ever GST under the Paris Agreement

- Advocating for transparency, human rights, and climate ambition in discussions surrounding Articles 6.2 and 6.4
- Proposing linkages between the Global Goal on Adaptation (GGA) and the GST, demonstrating a forward-looking approach to reviewing adaptation goals in 2028
- Lobbying for enhanced access to the adaptation fund, the fulfillment of pledges by developed countries, and the revision of country climate action plans (CAP) for adaptation funds
- Supporting the operationalization of the Loss and Damage Fund (LDF) and advocating for concessional funding, timely adaptation finance, and a balance between adaptation and mitigation
- Participating in the 15th FSV workshop, presenting its First Biennial Update Report (BUR1) to enhance transparency in reporting mitigation actions
- Advocating for climate finance and urging developed countries to fulfill their commitment to mobilize US \$ 100 billion annually by 2020, expressing concerns over the unmet 2023 deadline
- Emphasizing a multilateral approach to just transition, beyond labor transition, and persisting in maintaining "just transition pathways" in the final text and
- Participation in discussions on research and systematic observations, supporting the expanded scope of comprehensiveness of the 6th Assessment Report of IPCC.

viii. Natural Capital Accounting (NCA)

To facilitate the implementation of NCA, a funding allocation of US\$2 million under the Global Environment Facility (GEF) STAR programme and a five-part institutional framework has been outlined, which comprises:

- A National Steering Committee tasked with providing overarching governance, oversight, and guidance;
- An NCA unit within the Pakistan Bureau of

Statistics responsible for compiling the accounts;

- Technical Committees at the sectoral level to oversee data collection and submission;
- Two technical working groups, one dedicated to supporting data gathering and compilation and the other focused on integrating NCA into policy and programming;
- Development partners are engaged to offer overall guidance and technical assistance.

17.4 Green Programmes/Projects:

MoCC&EC, being the National Designated Authority (NDA) and the Focal point for international climate funds, serves as an interface between the Government of Pakistan and these funds, namely GEF and GCF. Ministry is working with these Funds and convening regular steering committee meetings to facilitate the projects to reduce and minimize the carbon footprint, achieving sustainable climate resilience as well as sustainable socio-economic growth in line with Nationally Determined Contributions (NDCs)

Following the approved projects/programmes being undertaken through GCF/GEF support in Pakistan:

a. Pakistan Distributed Solar Project

The project aims to offer customized financing solutions for distributed solar PV products in Pakistan, addressing the financing gap associated with these investments. Utilizing a guarantee facility provided by GCF amounting to US\$ 9 million, the project intends to finance 43 MW of solar PV installations for households, agribusinesses, and SMEs.

b. Community Resilience Partnership Programme

The Community Resilience Partnership Programme (CRPP), which amounts to US\$120 million and targets seven countries, including Pakistan, aims to expand adaptation measures at the community level to address the interconnected issues of climate change, poverty, and gender inequality.

c. Transforming Indus Basin with Climate Resilient Agriculture and Water Management

This project, with a GCF grant of US\$35 million, along with co-financing from the Sindh and Punjab governments, aims to enhance the country's capacity to utilize essential information for adapting to the impacts of climate change on agriculture and water management, employing cutting-edge technology. It aims to create a conducive environment for ongoing adaptation efforts.

d. Recharge Pakistan

Its primary objective is to diminish flood and drought risks across the Indus Basin. This initiative seeks to instigate profound transformation within Pakistan by directing investments towards Ecosystem-based Adaptation (EbA) and green infrastructure initiatives at three designated project sites within the Indus Basin. The initiative involves the rehabilitation of 14,215 hectares of deteriorated watersheds in DI Khan, including restoring 34 kilometers of flow paths. Furthermore, efforts will focus on desilting and revitalizing channels in the Ramak Watershed and Manchar Lake. Additionally, 127 additional green infrastructure interventions, such as recharge basins and retention areas, will be executed at designated DI Khan, Ramak, and Manchar-Chakar Lehri sites. These interventions aim to optimize flood reduction advantages for vulnerable communities within these areas.

e. Scaling-up of GLOF Risk Reduction in Northern Pakistan

The project endeavors to erect 250 engineering structures, comprising dams, ponds, spillways, tree plantations, and drainage systems, to mitigate risks with the GCF funding of US\$ 37 million. Concurrently, disaster management policies will be implemented, and weather monitoring stations, flood gauges, hydrological modeling, and early warning systems will be established to bolster the capacity for prompt response to flood events. By deploying Early Warning Systems (EWS) and Gabion walls, the project seeks to fortify the adaptation and resilience of vulnerable subsistence farmers and flood-prone communities, augmenting their

adaptive capacity. This extension of the EWS to 12 districts in Khyber Pakhtunkhwa and GB is anticipated to benefit 696,342 individuals directly. Strengthening sub-national institutional capacities will involve enhancing technical capacities in provincial lines and planning departments to integrate climate change into development plans and fostering effective coordination among sub-national institutions for implementing adaptation action plans and climate change initiatives.

17.4 Climate-Related Projects for Forestry

Pakistan has 4.51 million hectares (5.1 percent) of forest cover, with coniferous forests covering the most significant proportion at 37 percent, followed by Scrub Forests (22.2 percent), Mangroves (7.3 percent), Riverine Forests (7.8 percent), and Irrigated Plantations (6.3 percent). Despite this, the average annual deforestation rate stands at 11,000 hectares. To address this, MoCC & EC collaborate with provincial forestry departments to enhance forest cover. The Green Pakistan-Upscaling Programme, Phase-I, aims to revive forestry and wildlife resources nationwide, costing Rs. 125.1843 billion. The programme has achieved a plantation target of 2.12 billion plants nationally, monitored by a consortium of the International Union for Conservation of Nature (IUCN), the World Wildlife Fund (WWF), and the Food & Agriculture Organization (FAO), with a success rate of 75 percent to 95percent. The programme is undergoing revision for the next four years (2024-2028), expanding its scope to include carbon finance mechanisms, scientific resource assessments, livelihood creation, and biodiversity conservation. The initiatives taken by MoCC & EC to enhance forest/tree cover are as follows:

i. Reversing Deforestation and Forest Degradation in High Chilgoza Pine Forests of Pakistan.

This GEF-funded project amounting to US\$ 4.4 million contributes to the restoration, protection, and sustainable management of Chilgoza pine forests to provide global environmental benefits and enhance the resilience and livelihoods of local stakeholders in Pakistan. The project aims

to strengthen the regulatory and policy environment for integrated and sustainable management of the Chilgoza forest ecosystem along with the implementation of Chilgoza forest landscape conservation, restoration, and value chain development at the community level.

In collaboration with the FAO, a project is underway to conserve Chilgoza forests in Baluchistan, Khyber Pakhtunkhwa, and GB. This initiative has directly supported 8,443 households. Furthermore, it has facilitated natural regeneration across 2,153 hectares (equivalent to 4 million seedlings) and the planting of fruit and forest seedlings on 653 hectares.

ii. Indus Delta Blue Carbon

The Indus Delta Blue Carbon project marks one of the inaugural forest carbon trading initiatives. It emphasizes the restoration of 350,000 hectares of mangroves over 60 years through a public-private partnership. This endeavor holds a carbon sequestration potential of 127 million tonnes. Within this initiative, 75,000 hectares of degraded mangrove forests have been successfully restored, yielding benefits for 43,000 local individuals.

iii. National Action Plan for Forest Landscape Restoration

Extensive consultations with provincial and national stakeholders have led to developing a National Action Plan for Forest Landscape Restoration (FLR). This comprehensive plan delineates strategic priorities and actions for FLR, utilizing domestic resources and donor

funding. The action plan sets ambitious targets, including restoring 2.10 million hectares of degraded land and 1.20 million hectares of degraded watersheds. It aims to bolster landscape resilience against climate impacts and restore 0.7 million hectares of community forests, woodlots, irrigated plantations, and linear plantations by 2045.

iv) Biodiversity Conservation Planning

Pakistan developed its National Biodiversity Strategy and Action Plan (NBSAP) 2017-2030 in line with Aichi Biodiversity Targets (ABTs 2011-2020) and Sustainable Development Goals. In line with NBSAP, the national protected area coverage has been enhanced from 12 percent in 2018 to 17.85 percent. The alignment of NBSAP targets to the newly agreed Kunming-Montreal Biodiversity Framework has been initiated through an umbrella global project formulated by the CBD Secretariat.

v) Land Degradation Neutrality Target Setting Process (Phase-II)

UNCCD selected Pakistan as one of the 18 countries for the second phase of the Land Degradation Neutrality Target Setting Process (LDN TSP 2.0) in response to Pakistan's EOI submitted in 2023. Interventions are ongoing to revise LDN targets based on spatially explicit data and baselines, integrate them into national planning frameworks, and align them with other international agreements.

During July- December 2023, the government has signed MoUs/ agreements with UAE, Kuwait, and China regarding climate change. The detail is given in Box-2

Box-2: International Cooperation

- MoU was signed between Pakistan and China on Cooperation for Green and Low-Carbon Development in October 2023.
- An MoU was signed between the Ministry of Investment of the UAE and the MoCC&EC on 27 November 2023 regarding investment cooperation in wastewater treatment projects.
- An Agreement was signed between Government of Kuwait and the Government of Pakistan on 29th November 2023 regarding investment cooperation for the Development of Mangroves Rehabilitation Projects.
- A letter of support was provided to the Italian Agency for Development Cooperation (AICS) project 'Water for Development' (W4D), which aims to increase the climate adaptation of Gilgit Baltistan Province. The project W4D will be implemented by the UNDP in partnership with EVK2CNR.

Source: MoCC&EC

17.5 Provincial Climate Change & Environment Departments' Initiatives/Achievements

i. Punjab

- An Environment Endowment Fund has been established in Punjab as a sustainable source of funding for environmental projects, research, and activities
- The department is undergoing comprehensive automation to streamline processes, including E-Environmental Approvals, E-Enforcement, E-Laboratories, E-Industrial Mapping, E-Monitoring System, and E-Information Sharing. Procurement of necessary IT equipment is underway to support these efforts.
- The government of Punjab approved and notified the Punjab Clean Air Policy
- The Punjab Environmental Protection Council has approved the Plastic Management Strategy in 2023 as part of the Punjab Green Development Programme (PGDP).

The key pillars of the strategy encompass:

- Induction of Plastics Regulatory Regime
- Technological Innovation and Recycling Infrastructure
- Economic Incentives and Levies
- Institutional Capacity Building
- Citizens Engagement & Awareness
- Punjab Climate Change Policy is under process
- The department is underway expanding and strengthening environmental monitoring through, i.e., Water Quality Monitoring Stations and **Industrial Inspections**
- **The State of Environment Report (SOE)** was published in June 2023, thoroughly assessing Punjab's environmental quality. The succeeding SOE Report (2023) is going to be published by the end of FY 2024

ii. Sindh

- **The Sindh Climate Change Policy (SCCP)** was launched in 2022, and the implementation framework was aligned

with NCCP

- The Department of Climate Change (DoCC), in coordination with MoCC&EC, has developed an **Interim Strategy to access Voluntary Carbon Markets (VCM)** and prepare for generating carbon credits and Emission Trading.
- **A Climate Finance & Carbon Credit Unit (CFCCU)** is also proposed to be established at the DoCC to develop access to carbon markets and other sources of climate finance.
- **The Priority Actions (2030) for NDC Implementation for Sindh** are prepared using a collaborative approach in consultation with the province's stakeholders.
- The working draft of the Sindh Long-Term Low Emission Development Sectoral Strategy (LT-LEDS) has also been developed.

iii. Balochistan

- Provincial Climate Change Policy, along with the Action Plan and Financial Strategy of Balochistan, has been drafted and forwarded to the stakeholder departments for review
- Balochistan Environment Protection Agency (BEPA) has procured one (1) Ambient Air Quality Mobile Monitoring Station to monitor hazardous gases in the air, and procuring the second one is in progress.
- The BEPA has installed 11 Scrubbers in the Steel Mills at Quetta and Hub to control Carbon emissions.
- BEPA has installed 19 Effluent Treatment Plants in the industrial units, which discharge their effluents into the sea, thus protecting the sea from pollution.
- BEPA has dismantled/closed 39 crush plants in and around Quetta Valley to control dust emissions.
- BEPA has progressed by converting 40 Bull Trench Brick kilns to Zigzag technology in Mastung District.
- 21505.5 Kg Quantity of Infectious Hospital/Clinical Waste has been segregated, transported, and disposed of at

incineration facilities in Quetta District.

- Balochistan EPA has introduced solid recovered fuel (SRF) (commercial and municipal waste) as green energy in the DG Cement area in Hub town.
- Balochistan has promulgated and enforced “The Use of Plastic Shopping and Flat Bags Act, 2023” to combat Plastic Pollution in the Province.

iv. Khyber Pakhtunkhwa

During FY 2024, the Government of Khyber Pakhtunkhwa has successfully implemented the following development projects in the province:

- Zoo for Peshawar Division (Rs 2710 million).
- Conservation, Development, and Management of Wildlife in Khyber Pakhtunkhwa under Green Pakistan (GoP 50 percent and GoKP 50 percent) with the cost of Rs.439.405 million.
- Conservation and Management of Biodiversity in Suliman Range Sherani Area.
- Improvement of Management Effectiveness of Wildlife Sanctuaries in Khyber Pakhtunkhwa.
- Merged Areas Integrated Areas Development Forestry Sector Project (AIP) (Wildlife Component) Rs 1442.637 million.

Steps Taken for Conservation & Sustainable Development of Natural Resources

- Urban Forestry Policy of 2023
- The Khyber Pakhtunkhwa Forest Department has also developed Standard Operating Procedures (SOPs) to safeguard forests from wildlife.
- To enhance the sustainable management of Chilghoza forests and promote the production of various goods, services, and functions, including the enhancement of local livelihoods through Chilghoza nut value addition and value chain development, as well as the reduction of Greenhouse Gas Emissions, a GEF-funded project titled

“Reversing deforestation and degradation in high conservation value Chilghoza Pine Forests in Pakistan” was initiated in 2021 and is currently under implementation in Chitral and South Waziristan Districts of Khyber Pakhtunkhwa.

Concluding Remarks

The Government of Pakistan has taken various steps and initiatives including strategic planning and adaptation measures to address the needs of current and future generations—truly comprehensive measures to combat the negative effects of climate change. However, these efforts can be quite effective only with climate justice. Through joint efforts, the world can strengthen resilience against climate shocks and assure sustainable development and a secure future for its population in growing climate challenges. Moreover, developed countries should take the responsibility to engage with climate-friendly production practices, promote green growth, and put in resources to pay for the climate-related damages in developing countries. Also, Pakistan may continue its efforts to sensitize the global community about creating a climate-resilient society all around the globe. Long-term comprehensive planning and vigorous execution at all levels would be critical to a better future.

Among the other key developments in Pakistan regarding climate mitigation and environmental protection, provincial governments have also been keen to put in resources. Particularly, there are the creation of the Punjab Environment Endowment Fund and automation of environmental processes; the implementation of Sindh's Climate Change Policy and development of the Climate Finance and Carbon Credit Unit; air quality monitoring and plastic pollution control in Balochistan; and successful conservation projects and Urban Forestry Policy in Khyber Pakhtunkhwa. These actions show a strong commitment to action on climate change at the provincial level. To ensure the success and sustainability of these programs, this would, however, depend on global support and climate financing.