

Climate Change

Pakistan is assessed to be one of the vulnerable countries to climate change. This vulnerability is mainly due to its geographic location, demographic and diverse climatic conditions. Building resilience and adaptation to climate change is becoming indispensable for Pakistan. Fortunately, environmentally sound technologies are gaining a high priority in sustainable development policy dialogue and implementing frameworks. Technology Needs Assessment (TNA) is one of the important steps towards identifying and assessing climate change adaptation challenges for Pakistan in order to align its adaptation needs and opportunities with goals and objectives of its sustainable development. Furthermore, to mitigate the impact of climate change, the government has taken different initiatives, one of them is Green

Pakistan. Under this programme 100 million trees would be planted around the country in five years.

Programmes and Projects Undertaken in 2017-18

The government has already delegated the subject of environment to the provinces, but climate change which holds a wider scope is with federal government. Different projects under Prime Minister Green Pakistan Programme are being implemented. There are also projects like development of reverse linkages with MARMARA Research Centre Turkey, which will enhance our capacities to predict disasters like floods and earthquakes and Turkey will provide enhanced support and capacity building in seismic research and development. The ongoing projects being funded under PSDP are given below:

Table 16.1: PSDP funded projects

S. #	Name of Project	Estimated Cost (Rs Millions)
1	Establishment Geomatic Centre for Climate Change and Sustainable Development	48.90
2	Green Pakistan Programme – Revival of Forestry Resources in Pakistan	3652.14
3	Green Pakistan Programme – Revival of Wildlife Resources in Pakistan	738.90
4	Sustainable Land Management project to combat Desertification in Pakistan SLMP-11	105.43
5	Construction of Boundary Wall of Zoo-cum- Botanical Garden	90.10
6	Green Pakistan Programme - Strengthening Zoological Survey of Pakistan undertaking immediate inventory of endangered wildlife species and habitats across Pakistan	76.73
7	Generating Global Environment Benefits from Improved Decision Making Systems and Local Planning in Pakistan	193.55
8	Glacier Lake outburst Flood in Northern Areas GCF funding	3920.18
9	Establishment of Flood Forecasting and Warning System for Kalpani Nullah Basin, Mardan, Khyber Pakhtunkhwa	230.00
10	Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Weather Forecasting System (JICA)	2502.50
11	Installation of Weather Surveillance Radar at Karachi (JICA)	1580.00
12	Reverse Linkage Project Between Pakistan Meteorological Department and Marmara Research Centre (MRC), Turkey (IDB)	101.00

Source: Ministry of Planning, Development & Reform

Environment and Climate Change Programmes for 2018-19

Developing policies and procedures to keep the disastrous effects of climate change to minimum needs to be expedited for which following measures will be initiated

- a. Transformation of existing environmental policies into practice by implementing a programme based approach and to identify gaps and issues, activities and action plan as well as strategies to overcome the environmental issues.
- b. A realistic approach in the management of ecosystem will be carried out with the special emphasis on imperative ecosystem segments such as protection of biodiversity, water conservation and soil erosion protection, carbon sequestration and biodiversity protection, etc.
- c. In Pakistan, supply of drinkable water and sanitation services (WSS) requires special attention as presently a large number of households do not have access to enough potable or shallow water and there is lack of proper sanitation system. Poor sanitation leads to sickness as well as negative impact of ecosystem. Therefore, a strategy to improve sanitation and to expand access to clean drinkable water, particularly, in rural areas is being implemented with the help of provincial governments.
- d. Due to water scarcity in the country, waste water treatment is imperative for the continuous and affluent supply of water for agriculture in future. Despite having the potential and capacity of our industry for designing and fabricating waste water/sewage treatment plants locally, only a meager portion of industrial wastewater is being treated and reused. To treat and recycle industrial effluents, a Wastewater Treatment Programme will be initiated in the country in collaboration with the provincial governments.
- e. For increased Forestry cover and enhancement of natural resources, a strategy to develop forest cover along with conservation and restoration of the natural resources of the country will be implemented through applied approach of ownership. A strategy will also be designed to prepare locals to manage forest areas and wild lands around their residences. This would also

include provision of alternate energy resources to the residents of forest cover areas such as Liquefied Natural Gas (LNG) at affordable price.

- f. Moreover, as the shortage of Compressed Natural Gas (CNG) promotes the use of cheaper gasoline, the automakers need to be given stringent specifications to develop and market zero carbon emission vehicles. The new auto policy will enable the government to keep a vigilant eye on the producers, while, a vehicle certification policy is also under consideration which will not allow polluting vehicles on the road.

Adaptation and Mitigation Measures

Adaptation and mitigation are two main strategies for addressing climate. Since Pakistan has experienced several adverse climate impacts over the years and adaptation to these impacts is necessary for socio-economic development. Ministry of Climate Change has taken many initiatives in the area of climate change adaptation and mitigation in accordance with National Policy which are as under:-

- a) To ensure effective implementation of National Climate Change Policy and its Framework.
- b) Ministry of Climate Change has completed the process of signing and ratification of Paris Agreement by the Government of Pakistan.
- c) Pakistan Climate Change Council and Pakistan Climate Change Authority are being established to address the issues of climate change and meet Pakistan's obligations under international conventions relating to climate change.
- d) With the support of Climate Technology Centre and Network (CTCN), Ministry of Climate Change is carrying out Technology Needs Assessment (TNA) in Pakistan. The objective of this activity is to enable Pakistan to conduct TNA process and produce implementable Technology Action Plans (TAP) in line with current practices.
- e) "Strengthening Pakistan's National Policy Frameworks to Facilitate Resource Efficiency and Sustainable Consumption and Production" programme is underway with the support of United Nations Environment Program (UNEP). The aim of the program is to provide support in creating and strengthening environment for resource

efficiency and SCP National Action Plan covering the Sustainable Development Goals (SDGs) and its linkages with Climate Change.

- f) Preparation of Pakistan's Second National Communication (SNC) on Greenhouse Gases (GHG) emissions is under process.
- g) Biennial Update Report (BUR) is an extended report on National Communications which describes the status of GHG emissions and mitigation measures taken by the countries. Ministry of Climate Change has started preparatory work on Pakistan's first BUR.

Pakistan's Compliance with the International Framework for Climate Change:

Pakistan submitted its Intended Nationally Determined Contribution (Pak-INDC), under Article 2 of the Paris Agreement, to the United Nations Framework Convention on Climate Change (UNFCCC). Under the INDC, Pakistan intends to reduce up to 20 percent of its 2030 projected GHG emissions, amounting to 1603 million ton of carbon dioxide equivalent subject to the availability of international grants to meet the total abatement cost for the indicated 20 percent reduction amounting to about US\$ 40 billion at current prices. Pakistan's adaptation needs range between US\$ 7 to US\$ 14 billion/annum during this period. According to a preliminary projection, the GHG emissions levels for Pakistan are expected to increase many times in the coming decades. The sector wise detail of GHG emission is given below.

Table 16.2: Sector Wise Projection of GHG Emissions (Mt CO₂-equivalent)

Sector	1994	2015	2030
Energy	85.8	185.97	898
Industrial Process	13.29	21.85	130
Agriculture	71.63	174.56	457
Land Use change and Forestry	6.52	10.39	29
Waste	4.45	12.29	89
Total	181.7	405.07	1603

Source: Ministry of Planning, Development & Reform

Carbon Capture and Storage

An important path to low-carbon development is carbon capture and storage (CCS), which focuses on securing and storing carbon dioxide emissions before these are released into the atmosphere. Although this technology is still in its early stages, countries are committed to implementing variations of it with both bilateral and multilateral cooperation underway. This cooperation is

particularly important because implementing CCS on a large scale can be expensive and offers few obvious economic benefits. One of the major multilateral efforts in this area is the Carbon Sequestration Leadership Forum (CSLF), which supports joint efforts to develop cost-effective carbon sequestration technology.

Furthermore, renewable and nuclear energy can be of critical importance in diminishing reliance on fossil fuels and developing low-carbon communities. Expectations for nuclear power as an alternative source of energy are especially high among big emitters such as India, China, and the United States, as well as in a number of developing countries that lack the necessary infrastructure to meet their growing energy needs. Currently, the International Atomic Energy Agency (IAEA) assists countries in determining whether nuclear energy is a feasible option, the agency assists with energy planning and developing relevant infrastructure, such as drafting nuclear legislation and establishing independent and effective safety regulators.

There has also been significant international action on renewable energy. The International Renewable Energy Agency (IRENA), founded in January 2009, is the first international forum for specifically promoting the use of renewable energy. The United Nations Environment Program (UNEP) has launched several initiatives, including the Global Bio-energy Partnership (GBEP), to support the deployment of biomass and bio-fuels and the Solar and Wind Energy Resource Assessment (SWERA), which seeks to make renewable energy data widely available. Despite these promising international efforts, only about 25 percent of the world's energy is produced through renewable and alternative sources (including hydroelectric, biomass, and nuclear). However, investments in these areas continues to increase and more and more countries are setting policy targets for using renewable energy.

Policy reform might include steps like energy market reform or reduction of tariff barriers to low-carbon technology transfer. International institutions have begun to promote domestic policy shifts through measures like technical assistance provided by organizations like the UNEP and UNDP, discussions on tariff reductions for environmentally friendly technologies through the WTO, and processes aimed at phasing out fossil fuel subsidies spurred through the G20. Some existing

institutions, though, may incidentally work against positive developments in this area. The Kyoto Protocol's CDM, for example, may discourage countries from making climate-friendly policy changes by rewarding countries only for activities that go beyond existing national policy. Complicating matters, efforts to promote policy shifts and efforts aimed at providing assistance with clean development are rarely coordinated with each other.

United Nations Conference of Parties on Climate Change (COP-21)

The 21st Session of the Conference of the Parties (COP-21) to the United Nations Framework Convention on Climate Change (UNFCCC) was held in Paris in 2015 where world leaders, including Pakistan, hammered out an agreement aimed at stabilizing the climate and avoiding the worst impacts of climate change. The agreement consists of four main areas which are mentioned below:

- i. Adoption & Mitigation
- ii. Intended Nationally Determined Contributions (INDCs)
- iii. Technology Development and Transfer
- iv. Capacity Building

United Nations Climate Change Conference ("COP23") was an international meeting of political leaders and activists to discuss environmental issues. It was held in Bonn (Germany) from 6–17 November 2017. The purpose of the conference was to discuss and implement plans about combating climate change, including the details of how the Paris Agreement will work after 2020. Pakistan was also represented by a delegation.

Geomatic Center for Climate Change and Sustainable Development Project.

Geomatic Center for Climate Change and Sustainable Development Project in Pakistan Environmental Protection Agency Islamabad is one of the ventures under Ministry of Climate Change which encourages application of Satellite Remote Sensing (SRS), Geographical Information System (GIS) and Geographical Positioning System (GPS) technologies in environmental monitoring and decision-making. A well-equipped centre of geospatial technologies for environmental monitoring in Pakistan is also established in Geomatic Center for Climate Change

Climate change is a geographic problem and reducing the risks caused by climate change is an immense challenge. Scientists, policy makers, developers, engineers, and many others around the world are using geographic information system (GIS) technology to better understand a complex situation and offer some tangible solutions in environment and climate change scenarios. A GIS-based framework helps us gain a scientific understanding of earth systems at a truly global scale and leads to more thoughtful, informed decision making.

Digital Environmental Atlas of Islamabad

The Digital Environmental Atlas of Islamabad was launched and it assembles seamless, accurate cartographic data including maps and documentation regarding Islamabad's natural resource profile in the context of its land and environment. The basic objective of this Atlas is to enable the visualization of Islamabad's environmental information through maps. The spatial distribution of environmental indicators is extremely useful in several types of planning including environmental pollution control strategies. Most importantly, through GIS techniques used in preparing atlas maps, it is possible to combine various layers of information for identifying different types of soil, land use, vegetation distribution, stream network etc.

Digital Environmental Atlas of Islamabad covers physiographic, land use, vegetation analysis, hydrological analysis, climate change, geological hazards and air pollution for Islamabad Capital Territory. The principal datasets used for this atlas were LANDSAT satellite imageries for the years 1990, 2000, 2010 and 2016 which were acquired, processed, and analyzed for the preparation of land use/ land cover maps.

National Bio-Safety Centre (Cartagena Protocol).

Pakistan ratified Cartagena Protocol on March, 2009 under which it is obligatory to devise implementation mechanism for regulating Genetically Modified Organisms (GMOs) and their products. National Biosafety Guidelines were notified in October 2005 for the facilitation of applicants to follow procedures for the implementation of the Biosafety Rules in the country. The National Biosafety Centre (NBC) is working under the Pak-EPA Islamabad. The two committees i.e. Technical Advisory Committee (TAC) and National Biosafety Committee (NBC)

function for the purpose of granting licenses to the extent of Cartagena Protocol on biosafety.

Measures to Increase Forest Cover

Pakistan is one of the low forest cover countries with only 5 percent (4.34 million ha) of land area under forest and tree cover whereas international requirement is 25 percent. Forests are essential to ensure soil and water conservation and climate regulation. The government has taken different measures to increase the forest area.

Green Pakistan Programme

The Green Pakistan Programme is the initiative of the government to revive Forestry and Wildlife resources across the country. The main objective of the programme is to facilitate transition towards environmentally resilient Pakistan by mainstreaming notions of adaptation and mitigation through ecologically targeted

initiatives covering biodiversity conservation and enabling policy environment.

Green Pakistan Programme is being executed by the government through Ministry of Climate Change and Provincial Forest and Wildlife Departments including Gilgit Baltistan, Federally Administered Tribal Area (FATA) and Azad Jammu Kashmir (AJK) with a total cost of Rs 3.652 billion over a period of five years (2016-17 to 2020-21). The programme is implemented in 100 districts of the country. The Green Pakistan Programme has three major components i.e. revival of forestry resource of Pakistan, revival of wildlife resources in Pakistan and Strengthening of the Zoological Survey of Pakistan. The share of provinces in forestry component of programme is given as under:

S.No.	Provinces / Federating Units	Federal	Provincial	Total
1.	Punjab	541.199	722.554	1263.753
2.	Sindh	331.715	448.285	780.000
3.	Khyber Pakhtunkhwa	181.964	198.043	380.007
4.	Balochistan	89.307	223.697	313.004
5.	Ministry of Climate Change	183.634	-	183.634
6.	Azad Jammu & Kashmir	355.000	-	355.000
7.	Gilgit Baltistan	273.800	-	273.800
8.	Federally Administered Tribal Areas	102.945	-	102.945
	Total	2059.564	1592.579	3652.143

Source: Ministry of Climate Change

- The specific objectives of the project are to plant one hundred million new indigenous plants, including 20 percent fruit plants, over next five years as under:
 - a. Canal side/roadside plantations in Punjab, Khyber Pakhtunkhwa and Sindh.
 - b. Historic irrigated plantations of Changa Manga, Daphar, Bahawalpur and Chichawatni.
 - c. Olive and Kikar-Phulai forests in Kala Chitta, Pabbi- Rasul and Fort Monroe scrub forests of Punjab.
 - d. Mangrove forests in Karachi and Badin alongwith scrub hill forests of Khirthar range in Sindh.
 - e. Juniper forests of Ziarat and Chilgoza forest in Suleiman Range of Balochistan.
 - f. Watershed and soil conservation plantations and operations in Gilgit-Baltistan and AJK moist tropical forest areas (reserved as well as community forests).
 - g. Guzara forests in Murree/ KotliSattian and Hazara and protected forests of Malakand region in Khyber Pakhtunkhwa.
 - h. Dry temperate forests in FATA (Orakzai, North Wazirastan Agencies, etc.).

Seasonal Tree Planting Campaigns

In order to enhance tree cover in the country, seasonal tree planting campaigns are held each year. During the tree planting campaigns all the government departments, private sector organizations, defense organizations and NGOs were involved in planting activities. The achievements against target fixed for tree planting are as follows:

Season	Target(million)	Achievement	Survival Rate (%)
Spring 2017	257.5	201.8	78
Monsoon 2017	106.96	107.03	100

Mangroves for the Future (MFF)

Mangroves for the Future (MFF) initiative focuses on the countries worst affected by the tsunami. Pakistan joined MFF as a regular member in 2010. As a member Pakistan is entitled to receive support for institutional strengthening, capacity building and for implementation of small and large projects in coastal areas of Sindh and Balochistan. Under this initiative, four small grant projects costing upto US \$ 25,000 have been completed and similar numbers of new projects were processed for approval.

International Trade of Wildlife:

Pakistan is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1976. Import and export of wildlife is being dealt by Ministry of Climate Change in accordance with CITES and provisions of Trade Policy Order. During 2017, revenue earned through limited wildlife trade was Rs. 18.132 million.

Water, Sanitation & Hygiene (WASH) Programme

According to the Joint Monitoring Programme (JMP) report Pakistan has achieved its sanitation target for Millennium Development Goals (MDGs) i.e. 64 percent of the population have access to improved sanitation, whereas good progress is reflective on access to improved drinking water i.e. 91percent.Pakistan being signatory of Sustainable Development Goals

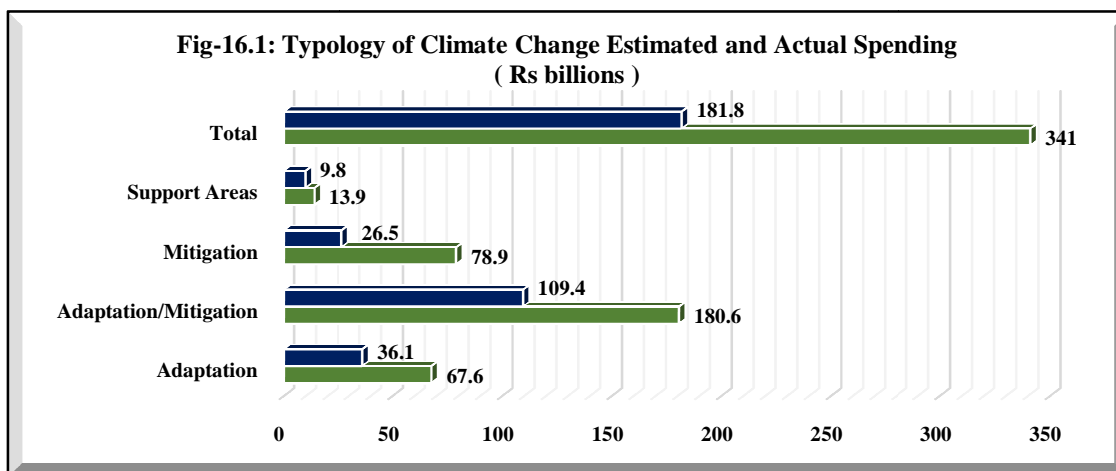
(SDG), as next step it was sighted that there is need to develop the action plan and base line for SDG-6 (6.1 &6.2). In this regard, workshops on SDG-6 were convened to devise the strategy for implementation of SDG. Ministry of Climate Change has provided technical support to design and develop the mass media campaign to improve and inculcate health water, sanitation and hygiene behavior.

Climate Change Expenditures

The SAP data shows federal government’s budget for 2017-18 at Rs 4,983 billion (excluding debt repayments) which included an estimated climate change-related budgetary allocations of Rs 341 billion—6.85 percent under different sectors.

By the end of March 2018, the federal government spent Rs 3,851 billion including an expenditure of Rs 182 on climate change actions. Of this, 181 billion was spent by three ministries namely Ministry of Finance, Revenue, Economic Affairs, Statistics and Privatization (49 percent), Ministry of Defence (20 percent), Cabinet Secretariat (14 percent). Ministry of Water Resources (4percent) and Ministry of Railways (3percent) are the other two major spenders on climate change. The composition of climate change expenditure in 2017-18 is broadly in sync with that of earlier years.

The break-up of budgetary allocations and actual spending till the end of March 2018 is summarized in the chart below.



The expenditure analysis has been done through the Climate Change Expenditure Tracking and Reporting System. A budget coding and tracking

system dedicated to climate has been designed and made operational in 2017-18. The system built on the methodology and data compiled under

the CPEIR, and uses IT-based expenditure data maintained by the Controller General of Accounts (CGA). Initially, the system provides basic information on how much the federal government is spending on mitigation and adaptation to climate change. The model would be replicated at sub-national level to eventually create a national climate change expenditure tracking system. The system provides a transparent and reliable tool for decision makers. It can help government in measuring Pakistan's financial contribution to climate action, monitoring progress toward meeting its international commitments under the Paris Agreement, and making a case for accessing international climate finance.

Launching of Climate Change Financing Framework (CCFF)

Ministry launched this broad framework to mobilize, manage, and target climate change finance at national and sub-national level in October 2017. The CCFF identifies different entry points for the mainstreaming of climate change into planning and budgeting processes, including in MTBF. Full implementation of the CCFF would enable the federal government to produce efficient, transparent and timely reports on budgetary allocations for climate change related projects and actual utilization of funds against those allocations.

Climate Public Expenditure and Institutional Review (CPEIR)

The CPEIR—which helps in estimating government spending on climate change, was completed and a report thereon launched in October 2017. The CPEIR 2017 was an improvement over the CPEIR of 2015 since it covered budget and expenditure data of all the provincial governments, GB, AJK, FATA and the federal government. The CPEIR of 2015 did not capture expenditure data of Sindh, Baluchistan, and Punjab. The CPEIR 2017 concluded that around 8.4 percent of total national expenditure is relatable to climate change. The federal government with its share of Rs 272 billion (48 percent) in total spending of Rs 569 billion was the largest contributor to this expenditure. The federal spending on climate change worked out to be 6.5 percent of the budget.

Revision in PC-1 template for Climate Change Responsive Planning

Currently, projects do not comprehensively factor in the potential impacts (including both positive

and/or negative ones) of climate change trends and vulnerabilities. To address this gap, Ministry formulated a proposal to change the PC-1 template and shared with Ministry of Planning, Development and Reforms. The revised PC-1 template would require simpler and higher level/strategic information on climate change from government agencies. The revised PC-1 template would help in identifying whether a project's risk profile is affected by climate change and whether the project would positively contribute to climate change policy, strategy and action plans. The government agencies would also indicate whether the project supports "adaptation" or "mitigation while also requiring them to assign "low, medium, or high climate-relevance rating to each project. Ministry has also proposed guidance for government agencies as part of this change in PC-1 template. Once implemented, the change would facilitate climate-responsive development in Pakistan.

Integration of Climate Change in MTBF

A key policy reform measure of the CCFF included integrating climate-responsive long term planning and budgeting in the MTBF. The MTBF of centralized government entities (federal ministries, provincial government departments and their attached departments) offers one such entry point. The Ministry of Water Resources has agreed to be a pilot for this exercise, in coordination with the Ministry of Climate Change. With UNDP's assistance, a number of Focus Group Discussions were organized during January-April 2018 with key officials of the Ministry of Water Resources and Provincial Irrigation Departments. Following this consultative process, a proposal for a climate-friendly MTBF will be formulated. It is expected that government will gradually expand this approach in future.

Sustainable Development Goals

The SDGs are universal set of 17 goals, 169 targets and 200 plus indicators that UN member states are expected to localize in their own development agendas and socio-economic policies during the period 2015-2030. The parliament of Pakistan adopted sustainable development goals (SDGs) as its own national development goals in February 2016. In recognition of the fact that climate change needs to be addressed at all levels with the utmost urgency, the SDGs have laid out a number of goals with specific indicators relating to

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environment and climate change. The specific goals are:

SDG No.	Sustainable Development Goals	Description
13	Climate Change: Taking Urgent Action to Combat Climate Change and Impacts	The goal aims to strengthen resilience and adaptive capacity to climate related hazards and natural disasters. It also aims to integrate climate change measures into national policies, strategies and planning. Furthermore, it encourages countries to improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning amongst other targets.
14	Life Below Water: Conserve and Sustainable use the Oceans, Seas and Marine Resources for Sustainable Development.	The goal aim is to reduce marine pollution, manage marine and coastal ecosystems, address impacts of ocean acidification, regulate harvesting and over fishing, conserve marine areas and increase scientific knowledge and develop and transfer marine technology amongst other targets,
15	On Land: Protect Restore and Promote sustainable use of Terrestrial Ecosystems Sustainably Manage Forest Combat Desertification and Halt and Reverse Land Degradation and halt biodiversity loss are directly related to climate change sector.	The goal is to ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems, promote sustainable management of all types of forests, halt deforestation and restore degraded forests. The goal also aims to combat desertification, ensure conservation of mountain ecosystems, take action to reduce degradation of natural habitats and integrate ecosystem and biodiversity values into national and local planning amongst other targets.

Sustainable land management will enable the government to get the desired forest cover and land use plans to be implemented to get the maximum output from fertile land. Pakistan still needs to improve enormously on the fronts of access to sanitation, solid waste management and energy efficiency. There is dire need to get the population sensitized and a change in their attitude is imperative.

Conclusion

Climate change is a geographic problem and reducing the risks caused by climate change is an immense challenge. Pakistan is consistently ranked by multiple climate change vulnerability indices as being one of the most vulnerable to the

impacts of climate change due to drought, floods, heat waves, and glacial lake outburst floods in the past few decades.

The government is cognizant of this issue and is taking strategic adaptation measures at the policy management and operational level to minimize the global warming effects. Further efforts to overcome the challenges of climate change are made through enacting legislation, setting standards and developing and implementing policies for a secure and lively environment. The existing and proposed measures being taken by the government would help to address the climate change issues effectively.