YEAR BOOK

2016-17

Government of Pakistan
Ministry of Climate Change
Islamabad

Message from the Minister/ Advisor

Climate Change is likely to have multi-faceted adverse effects on the ecosystem as a whole, particularly on the already vulnerable forestry sector in Pakistan. The most likely impacts of climate change will be decreased productivity, changes in species composition, reduced forest area, unfavorable conditions for biodiversity, higher flood risks and the like, as portrayed in the Planning Commission Task Force on Climate Change (TFCC) Report. Adaptation in the forestry sector entails the need to restore and enhance Pakistan's forests under sustainable forest management, with particular focus on how these are affected by climate change. This will not only benefit state forests but forest dependent communities and society as a whole. The scope of this part of the policy is to recommend adaptation measures to prepare Pakistan's forestry sector to withstand present and possible future impacts of climate change. To minimize the risks and vulnerability of forests and biological diversity from climate change, the Government of Pakistan, in collaboration with relevant entities, takesvarious measures.

The Book includes all the policy initiatives and an overview of the performance of Ministry of Climate Change and I hope it will be a useful source of information for researchers, scholars and general readers for improvement of environment and sustainable development.

(MALIK AMIN ASLAM)
Minister/ Advisor on Climate Change

Foreword

In pursuance of Sub Rule (2) of Rule 25 of the Rules of Business 1973; the Ministry of Climate Change has prepared and uploaded on its website Year Book 2015-16. The book contains material about its functions, activities and achievements of the Ministry and its attached departments for the information of Cabinet and all Ministries.

Climate Change is likely to have multi-faceted adverse effects on the ecosystem as a whole, particularly on the already vulnerable forestry sector in Pakistan. The role of Forestry in climate change mitigation has been overwhelmingly recognized at theinternational level. Pakistan, as a party to international agreements and conventions, has variouscommitments and obligations related to forests which require national-level actions and the cooperationof all Provinces and Territories hereinafter referred to as Provinces and Territories. Specifically, thesections under the United Nations Framework Convention on Climate Change UNFCCC on ReducingEmissions from Deforestation & Forest Degradation REDD+ have to be dealt with at the national level torealize the benefits from this international financial mechanism. Similarly other multilateral financingmechanisms including Green Climate Fund (GCF) and bilateral funding require national levelcommitments and actions.

The Year Book 2016-17 is a comprehensive document which highlights efforts of the Ministry on addressing possible challenges of climate change. It is expected that this Year Book will provide all necessary information about the activities undertaken by the Ministry and its attached departments.

Any suggestion/observation for further improvement would be appreciated.

(AAMIR ASHRAF KHAWAJA)
Secretary

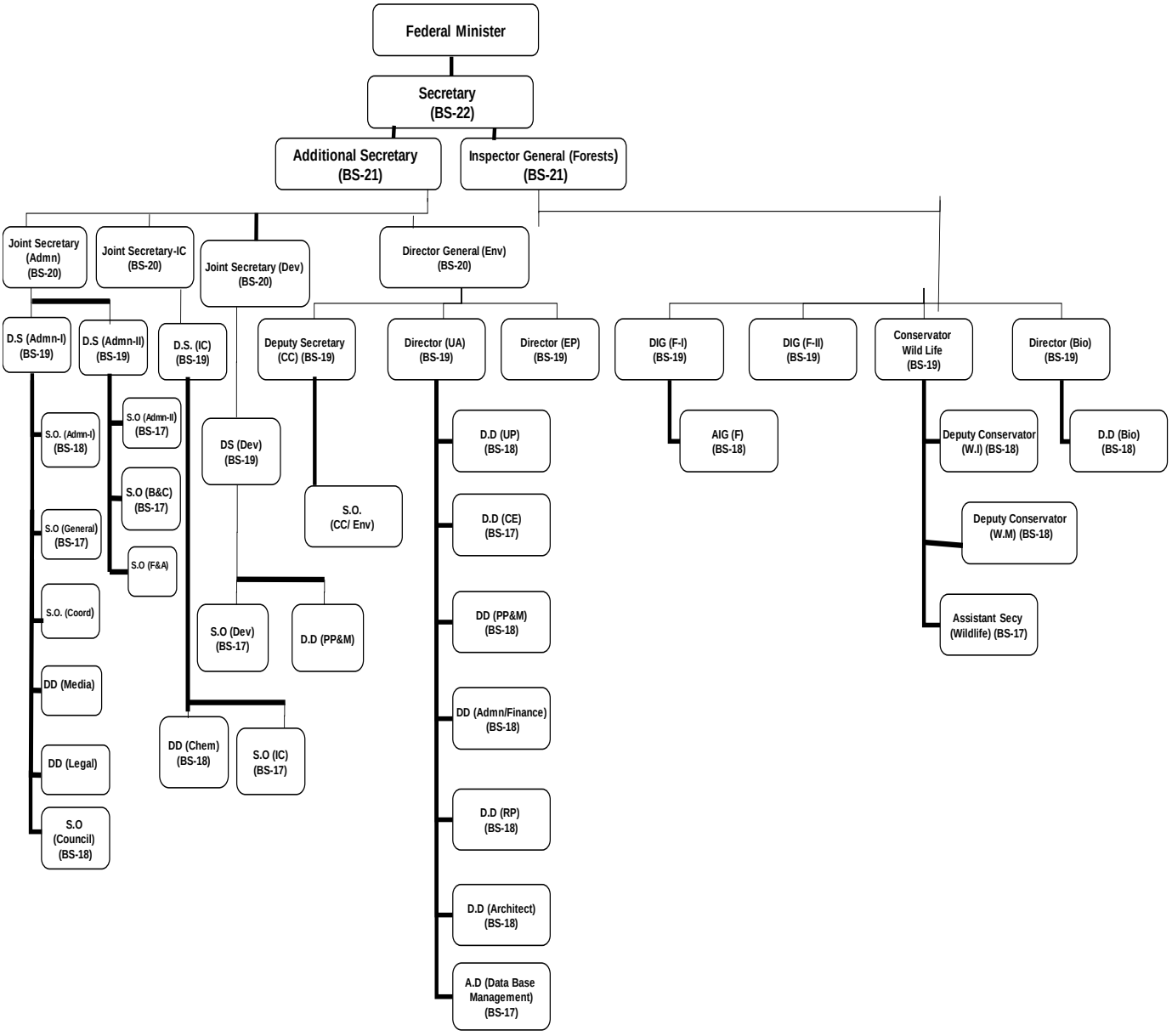
1. ADMINISTRATION WING

Total strength of the Climate Change Division during the year under report is 192 employees (52 officers and 140 staff members).

The Administration Wing is headed by a Joint Secretary of this Division. The responsibilities of the Administration Wing are as under:-

1. Personnel Administration of the officers / officials of the Division.
2. Personnel administration of officers of the attached departments/organizations / projects.
3. Budgetary (non-development) and financial matters of the Division and its attached department/organizations.
4. Matters relating to audit, Public Accounts Committee (PAC) and Department Accounts Committee (DAC).
5. Implementation and follow up of Cabinet Decisions and President's / Prime Minister's Directives.
6. Coordination between wings of this Division and with other Ministries/Divisions.
7. Matters relating to National Assembly / Senate and Standing Committees.
8. Matters relating to hiring of residential accommodation.
9. Re-imbursement of medical charges to the serving / retired officers.
10. Maintenance of PER record of all employees of this Divisions and attached departments and maintenance of annual declaration of assets.
11. Processing promotion, pay and pension cases of the officers / officials of the Ministry and its attached departments.
12. Trainings, conferences, seminars and visits abroad.
13. Printing of Year Book.

Organogram of Ministry of Climate Change



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2. DEVELOPMENT WING

The Development Wing is headed by Joint Secretary (Development). The responsibilities of the Development Wing are as under:-

1. All policy matters relating to development schemes/initiatives.
2. All budgetary matters of PSDP Development projects.
3. Reconciliation statements.
4. Internal monitoring of development projects.
5. Work/cash plans.
6. All cases of defunct M/o Environment relating to PSDP projects.
7. All administrative matters PSDP projects of Ministry
8. Matters relating to DDWP/CDWP.
9. Matters relating to DAC/PAC in r/o development projects.
10. Interaction and Coordination with all Wings of MoCC as well as with the projects.

Following are the main ongoing projects:

1. Establishment of Geomatic Centre for Climate Change and Sustainable Development

Cost Rs.48.885 million Allocation 2016-17-Rs.10.00 million

Objectives of the project are as under:

- Setting up of spatial referenced data collection, processing and exchanging harmonized framework according to the needs of all users working in the area relevant to atmospheric sciences, irrigation, agriculture, forestry, geology, lakes, marine resources, and urban infrastructure for socio-economic development projects;
- Promote application of GIS, SRS and GPS technologies in assessing existing situation of forest, desertification, soil, climate, environmental pollution, marine life, coastal areas, snow and glacier, disasters, hazards, biodiversity, water resources, ecological zones;

- Facilitate better environmental planning in the country, particularly for rational and scientific decision-making through assessment of environmental impact of different human activities, making them compatible with the objectives of sustainable development;
- Providing facilities for GIS data generation, customization, generation of maps, their publications and reporting;
- Enhance and upgrade institutional capacity of Pak-EPA, Ministry of Climate Change in the use of SRS, GIS and GPS for environmental monitoring and management;
- Collaborate with GIS & SRS department of partner universities / sector institutions in research oriented projects;
- Support the Ministry of Climate Change and Planning Commission to generate predictive tools for environmental planning and management in combination with normal remote Sensing and GIS tools;
- Facilitate Federal and provincial governments in disaster risk reduction through vulnerability mapping, information clearing house mechanism and training to use latest available technologies for risk assessment from various forms of hazards;
- Provide a platform equipped with latest information/data, digital and spatial library to national, provincial and local government institutions for framing disaster management frameworks and early warning mechanisms.

Major activities performed during 2016-17:

1. Operationalizing of Geomatic Centre and establishment of well-equipped center of geo spatial technologies for environmental monitoring in Pakistan.
2. Hiring of employees in project after proper test and interview.
3. State of Environment report for year 2015-2016, first draft completed.
4. Monitoring of Industries of industrial areas of Islamabad for Pollution Control.
5. Started Operationalizing of Central laboratory for Environmental Analysis and Networking (CLEAN).

Benefits on completion of project:

- A well-equipped Centre of geospatial technologies for environmental monitoring in Pakistan.
- Established Spatial and thematic database on various environmental issues such as natural resources, natural and anthropogenic hazards, and pollution levels.
- Generation of thematic maps for resources inventory and spatial analysis
- Standardization of geographic and spatial data related to environment. Standardization of the data compatible to international standards, so to make its use for international comparison
- Database of historical data that will be used in the future planning & prediction/ Baseline data of the existing environment of the country
- Annual release of State of Environment Report.

2. Sustainable Land Management to combat Desertification in Pakistan (SLMP-II)

SLMP-II project was approved by the CDWP in March 2015 at a total cost of Rs. 1666.695 million. The project started its operation from September, 2015. This project is an up-scaling phase of the SLMP pilot phase project to be implemented in 14 dry land districts in 4 provinces. It will assist the Government of Pakistan to achieve the long-term goal – "to combat land degradation and desertification in Pakistan" with the primary objective - "To promote sustainable management of land and natural resources in the arid and semi-arid regions of Pakistan in order to restore degraded ecosystems and their essential services, reduce poverty, and increase resilience to climate change". The project will depend on the strong commitment of the provincial and Federal Governments of Pakistan and the involvement of key stakeholders, in particular those at the community level. The project will deliver three outcomes:

Outcome 1: Strong enabling environment at national and provincial levels supports up-scaling of SLM practices;

Outcome 2: Effective, targeted and adaptive implementation of SLM Land Use Planning & Decision Support System;

Outcome 3: On-the-ground implementation of climate-resilient SLM activities is up-scaled across landscapes. The project will result in successful application of SLM over an area of 800,000 ha in 14 districts covering more than 200 villages. The integrated activities will be performed in Agriculture, Forest, irrigation, livestock, rangelands and soil conservation/stabilization sectors.

Districts in Phase-II
Punjab: Chakwal, Bhakkar, Khushab, Layyah
Sindh: Tharparker, Umerkot, Sanghar
KPK: D.I. Khan, Lakki Marwat
Balochistan: Pishin, KillaSaifullah,Mastung, Kech, Lasbella

Project Districts:

GEF---UNDP	588.412
Government of Pakistan (Federal PSDP)	105.43
Government of Punjab (ADP)	191.214
Government of Sindh(ADP)	200.4
Government of KPK(ADP)	141.809
Govt. of Balochistan(ADP)	200.00
Community share (in kind)	239.430
G.Total	1666.695

Detail of Project fund's donors is given below: (Rs. In Millions)

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3. INTERNATIONAL COOPERATION WING

1. National Ozone Unit

Montreal Protocol on the Substances that Deplete the Ozone Layer was signed at Montreal, Canada, in 1987. Pakistan signed and ratified the Protocol in 1992. The National Ozone Unit was established under the devolved Ministry of Environment in 1996 to supervise and ensure implementation of the Protocol. The main objectives of the project are to:-

i. Control import of Ozone Depleting Substances (ODS) under the provisions of Montreal Protocol.

ii. Assist the local industry for phasing out the use of ODS through the implementing agencies (UNDP, UNIDO, UNEP and World Bank) with the financial and technical support of the Multilateral Fund Secretariat (MLFS).

Progress/Achievements

Major achievements during the year 2016-17 are as follows:-

A. Implementation of the ODS Phase Out projects

i. National Ozone Unit, Ministry of Climate Change undertook National Survey on Ozone Depleting Substances Alternatives". The objective was to collect and analyze the data on use of Ozone Depleting Substances (ODS) alternatives in Pakistan including Hydrofluorocarbons (HFCs), HFCs Blends, Hydrocarbons (HCs), Hydrofluoroolefins (HFOs), Hydrofluoroethers (HFEs) and other ODS alternatives used in various sectors including Aerosols, Solvents, Fire-fighting equipment etc. It is to mention that survey will focus all types of imports, exports, industrial usage, servicing sector, Motor Vehicle Air Conditioning sector etc.

ii. Small Scale Funding Agreement (SSFA) was signed between United Nations Environment Programme and Ministry of Climate Change (MOCC), National Ozone Unit regarding Survey of Ozone Depleting Substances (ODSs) alternatives survey in Pakistan at a cost of US$ 130,000/- on 08/01/2016.

iii. Advertisement for inviting quota requests was published in leading National dailies. Applications received for the quota were minutely examined in a full transparent way. Quota for 2016 was formulated and approved accordingly. The quota was disseminated among the relevant stakeholders i.e. Federal Board of Revenue, Ministry of Commerce and HCFCs importer.

iv. Various training programmes for Customs, Coastguard and Police Officers on management of Ozone Depleting Substances were held at Karachi, Lahore and Islamabad; wherein 73 officials were trained.

v. National Ozone Unit, MoCC invited different Universities to submit research proposals on the issues related to Ozone Layer and Ozone Depleting Substances. The study proposal; "Spatial-temporal modeling of stratosphere ozone over Pakistan and studying its relation with climate datasets" which was awarded to College of Earth and Environmental Sciences, Punjab University, Lahore.

vi. The Executive Committee of the Multilateral Fund for the Implementation of Montreal Protocol, at its 76th meeting held in Montreal, Canada from 9-13 May, 2016 approved, in principle, stage II of the HPMP for Pakistan for the period 2016 to 2020 to reduce HCFC consumption by 50 percent of its baseline, at a total funding level US $5,679,476, consisting of US $4,776,772, plus agency support costs of US $334,374 for UNIDO, and US $503,000, plus agency support costs of US $65,330 for UNEP. The 76th Ex.Com also approved the first tranche of stage II of the HPMP for Pakistan, and the corresponding tranche implementation plan, in the amount of US $2,740,690, consisting of US $ 2, 00,000, plus agency support costs of US $ 25,976 for UNEP.

vii. Held meeting with Pakistan Heating Ventilation Air Condition & Refrigeration (HVACR) importers and traders association on the issues of HS codes for import of HCFCs in Pakistan on 09th May, 2016.

viii. Organized 1st Refrigeration Air Conditioning (RAC) association meeting to promote code of good practices on 8th June, 2016 at Lahore. HCFC technicians and members associated with Pakistan HVACR importer and traders association attended the meeting and they were informed about the international good practices adopted in RAC sector.

ix. National Ozone Unit, Ministry of Climate Change in collaboration with United Nations Environment Programme organized a workshop on "National Survey on Ozone Depleting Substances Alternatives" on July 11, 2016 at Lahore. The workshop intended to collect and analyze the data on use of Ozone Depleting Substances (ODS) alternatives in Pakistan.

x. Meeting with representatives of Pakistan HVACR importers and traders association was held on 14th July, 2016 at Karachi.

xi. Held consultative meeting with line Ministry's on "North American HFC Phase down Proposal under Montreal Protocol" on 15th August, 2016.

xii. Issued and monitored HCFCs import quota for the year 2016 and 2017.

xiii. Organized Train the Trainers Programme for Refrigeration Technicians in February 2017 in collaboration with NAVTTC and UNEP. International trainers were invited to impart training to local Master trainers. In total, 26 Master trainers were trained from all over Pakistan.

xiv. Organized Train the Trainers Programme for Customs officers at DGTR, Karachi and Lahore from 13-18 March, 2017. Around 60 Customs officers were trained by International Customs expert.

xv. Organized 1st Ozone 2 Climate Technology Road show at Lahore from 20-22 March, 2017 for interaction of different industries and to display Ozone friendly appliances/ products. Refrigeration, Air Conditioning and foam industry as well as HCFCs importers displayed their climate and ozone friendly products.

xvi. Prepared and submitted Pakistan's annual Article-7 data and Country Programme Report 2016 to Ozone Secretariat which reflects that Pakistan is in compliance with regard to implementation of Montreal Protocol.

B. Enforcement of Policy/Regulatory Measures

Effective compliance of ODS phase out was ensured and **10 % reduction targets** of the HCFC phase out on 1st January, 2015 was met and accordingly indicated in **HCFC quota 2016.**

2. Persistent Organic Pollutants (POPs)

Persistent Organic Pollutants (POPs) are highly toxic chemical considered as global threat to human health and environment. Stockholm Convention on POPs was ratified by Pakistan in 2008. Global Environment Fund (GEF) sponsored project titled "Comprehensive reduction and elimination of Persistent Organic Pollutants (POPs) in Pakistan" executed by UNDP Pakistan through National Implementation Modality (NIM) involving Ministry of Climate Change (MoCC) as implementing partner was started in 2015. This project is planned to be completed in 5 years i.e. till March 2020.

This project aims to reduce human health and environmental risks by enhancing management capacities and disposal of POPs in Pakistan through three main components:

i. Development and implementation of a regulatory, policy and enforcement system to reduce POPs releases and to regulate POPs waste disposal.
ii. Capacity building to reduce exposure to and release of POPs.
iii. Collection, transport and disposal of 300MT of polychlorinated biphenyls (PCBs) and 1200MT of POPs pesticides.

The main achievements during 2016-2017 around these components are;

i. In Pakistan, a set of environment related laws does exist both on the side of environmental protection and pesticide management. However, the existing legal framework is not yet compliant with Stockholm Convention requirements, with specific reference to the list of restricted chemicals, the management of hazardous waste, including waste containing POPs or PCBs. To address this gap, project started on hiring services of legal consultant. Hiring process of legal consultant was completed by the end of 2017.
ii. Considering the lack of capacity in federal and provincial environment department to test all kind of POPs, project started for up-gradation of EPA laboratories which included; capacity building of academia, procurement of GC-MS equipment for testing all kinds of POPs samples.

iii. 475 MT of POPs pesticides and PCBs have already been transported and disposed of through a transport and disposal vendor from federal plant protection departments in Peshawar, Sukkur (Larkana Warehouse), Mirpur Khass, Lahore, Bahawalpur, Quetta, Electric in Karachi and Mangla Power Station.

iv. The inventory of PCBs was missing from National Implementation Plan (NIP) and there was no PCB management plan in place at national level. Project started work to develop PCBs Inventory and management guidelines with formal sampling and chemical analysis of the transformers for PCBs contamination to eliminate or phase out PCBs contaminated equipment and oil from Pakistan even after the end of project.

v. 13 numbers of different national and provincial level trainings were held to sensitize all relevant stakeholders on POPs including specific trainings for Customs officers and Energy Sector. Up till now following number of trainings on POPs have been completed for academia, Government Servants and laboratories, Chamber of Commerce & Industries and NGOs;

- ✓ 4 Trainings in Punjab
- ✓ 4 Trainings in Sind
- ✓ 2 Training in Baluchistan
- ✓ 2 Trainings in AJK

3. Chemical Section

i. Communicated National Report of Basel Convention for the year 2016 through electronic reporting system to the Secretariat.

ii. Processed all matters regarding import of waste/scrap under Basel Convention with coordination of provincial environment protection departments.

iii. Organized National Training Workshop on Mercury Inventory Using UNEP's Toolkit from 07-09 September 2016, Islamabad.

iv. Organized Awareness Workshops on Minamata Initial Assessment (MIA) &Training on Inventory of Mercury and Mercury Compounds in products in Pakistan (Karachi, Lahore, Quetta, Muzaffarabad and Peshawar)

v. Organized meeting of National Coordination Committee of MIA project held on 09thJune, 2017

vi. Conducted programme on Radio Pakistan for awareness on Minamata Convention on mercury.

vii. Conducted field visits to relevant departments and EPAs for updating inventory of initial and new Persistent Organic Pollutants (POPs) in Pakistan at Karachi, Lahore, Quetta, and Peshawar.

viii. Organized donors' roundtable meeting of ship dismantling project on 14th December, 2016 at Islamabad.

ix. Completed a successful project titled "Environmentally sound management of waste from ship dismantling in Pakistan".

x. Processed annual mandatory contributions to Basel, Rotterdam and Stockholm Conventions.

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4. ENVIRONMENT WING

Climate Change is regarded as the greatest challenge facing the world. The work of Intergovernmental Panel on Climate Change (IPCC) over the last decade has confirmed that average global temperatures are increasing since the industrial revolution, mainly as a result of an increase in concentration of Green House Gases (GHGs) in the atmosphere and that future global temperature rise is almost inevitable in the 21st Century. The increases in global temperatures and the associated changes in precipitation, glacier melt and sea level rise is expected to have considerable direct and indirect impacts on various socio-economic sectors, such as water, agriculture, health, forestry, and biodiversity.

According to Global Climate Risk Index (2017) Pakistan ranks at 7th position among the most adversely affected countries by Climate Change. Despite having high vulnerability of future climatic changes, Pakistan is still among very low GHG emitter countries. However, being a responsible state and part of international community Pakistan is planning to take serious steps for playing an effective role in lowering GHG emissions.

Realizing the high vulnerability to Climate Change, the Government has developed national policy to combat Climate Change and an action plan is being developed to effectively implement Climate Change concerns through sustainable planning. To materialize the efforts regarding protection of Climate Change the Government has enacted "Pakistan Climate Change Act 2017". The legislation has in turn created Climate Change Fund, Climate Change Council and Climate Change Authority to implement the Climate Change Act.

Pakistan is a country without a choice on climate adaptation as it is facing up to the impacts at ground "zero". Our climate adaptation needs are between $7 to $14 billion per annum and this is all forced adaptation.

Future projects and programs for 2017-18

The Wing will implement the following projects in the FY 2017-18.

i. Establishment of Pakistan WASH strategic Planning Cell
ii. Climate Resilient Urban Human Settlement Change Reporting Unit
iii. Establishment of Climate Change Reporting Unit

Impact of environmental degradation

i. Pakistan's vulnerability from climate change is due to geographic, demographic and diverse climatic conditions. Particularly the environment changes threats to water, energy and food security due to the inherent arid climate coupled with the high degree of reliance on water from glacier snowmelt. Its impacts are being felt through increasing intensity and frequency of extreme climatic disastrous events, as well as small, but incremental changes insidiously affecting many sectors of government activity. Pakistan's response to the challenges of global warming and climate change has been closely aligned with its strategies for environmental protection, sustainable development goals (SDGs) and objectives of the Convention on Climate Change.

ii. Adoption of the National Climate Change Policy 2012 provided a comprehensive framework for policy goals and actions towards mainstreaming climate change, especially in economically and socially vulnerable sectors of the country. A follow-up to these policies was the launch of framework for Implementation of the Climate Change Policy (2014-2030), which outlines the vulnerabilities of various sectors to climate change and identifies appropriate adaptation and mitigation measures. The Framework document was developed to serve as a catalyst for mainstreaming climate change concerns into decision making at national and sub-national levels and to create an enabling environment or an integrated climate compatible development process. The document promotes preparation of the National Adaptation Plan (NAP), Nationally Appropriate Mitigation Actions (NAMAs) to the United Nation Framework Convention on Climate Change (UNFCCC) as well as detailed sub national adaptation action plans.

iii. In order to achieve the objectives of these policy initiatives, the country has considerably improved and strengthened its climate governance structure over time. Climate change and environmental protection have been extensively recognized at national level and specific

budgetary allocations have been made at national and sub-national levels for execution of the Framework for Implementation of the Climate Change Policy.

Pakistan's adaption to climate change

Pakistan being highly vulnerable to extreme climate events is into a state of forced adaption. There is a huge potential for adaption in Pakistan, particularly in strengthening and fortifying the flood infrastructure including water reservoirs and water channels. This would involve enhancing reliance of local communities to the adverse impacts of climate change. According to Pakistan's Intended Nationally Determined Contribution report, the adaption need is between US $ 7 to US $ 14 billion/ annum.

Climate Public Expenditure and Institutional Review (CPEIR)

i. CPEIR is a systematic qualitative and quantitative analysis of a country's public expenditures on climate change. It is an innovative tool which reviews the country's climate change plans and policies, institutional framework and public finance architecture to make recommendations to strengthen them. The UNDP has conducted CPEIR in partnership with the government.

ii. It is the first effort of its kind in Pakistan to determine the levels of expenditure being made by the government on climate change. The results reveal that the investments made by the government are quite significant, though not sufficient to meet the expanding challenges of climate change. The federal climate-related expenditure is estimated to be 8.5 percent of total national expenditures.

Adaptation and Mitigation Measures.

i. Globally environment related issues are going to play a major role in the social and economic development of countries, especially the underdeveloped ones. Ministry of Climate Change has taken many initiatives in the area of climate change adaption and mitigating in accordance with National policy w United Nations Conference of Parties on Climate Change (COP-21) The 21st Session of the Conference of the Parties (COP-21) to the UN Framework

Convention on Climate Change (UNFCCC) was held on 30th November 2015 in Paris where world leaders including Pakistan signed an agreement aimed at stabilizing the climate and avoiding the worst impacts of climate change. The agreement consists of four main areas are as under:

i. Adoption & Mitigation

ii. Intended Nationally Determined Contributions (INDCs)

iii. Technology Development and Transfer

iv. Capacity Building

ii. The focus was to monitor progress on mitigation pledges in terms of global annual emissions of green house gases by 2020. In continuation to this event, COP-22 was held with the objective to move forward on the implementation of the Paris Agreement.

Intended Nationally Determined Contributions (INDCs)

Ministry of Climate Change has developed Pakistan's Intended Nationally Determined Contributions (INDCs) with mitigation and adaption challenges that it faces and proposes actions that can assist in addressing these challenges through both domestic and international support. HABITAT-III Conference. Ministry of Climate Change has developed national report for HABITAT-III Conference. The report reviews the implementation of Habitat-II agenda and other relevant internationally agreed goals and targets as well as new challenges, emerging trends and a prospective vision for sustainable human settlements and urban development.

Technology Needs Assessment (TNA)

Ministry of Climate Change has initiated Technology Needs Assessment (TNA) with the help of Climate Technology Centre and Network (CTCN). The objective of the activity is to enable Pakistan to conduct TNA process and produce implementable Technology Action Plans (TAP) in line with current best practices.

Sustainable Consumption and Production (SCP)

i. Ministry of Climate Change in collaboration with United Nations Environment Program (UNEP) is implementing Sustainable Consumption and Production (SCP) titled "Strengthening Pakistan's National Policy Frameworks to Facilitate Resource Efficiency and Sustainable Consumption and Production." The aim of the program is to provide support in creating and strengthening enabling environments for resource efficiency and SCP National Action Plan covering the Sustainable Development Goals (SDGs) and its linkages with Climate Change.

ii. The government has started work on the Preparation of Second National Communication (SNC) report on Green House Gases (GHG) emissions. This will be a three year study leading to stocktaking of all GHG emissions in country with options of mitigation and adaptation actions.

State of Pakistan Cities

UN-Habitat with the help of Ministry of Climate Change is in the process of preparing a State of Pakistan Cities Report. The report will present a well informed and action oriented analysis on the state of urbanization in Pakistan. It will include quantitative and qualitative city-based data and conduct specific analyses of key national, provincial and municipal urban development challenges on cities and towns in all provinces of Pakistan. The report would be important tool in formulating an urban agenda and policies and for shaping the national development agenda for the coming years.

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6. FORESTRY WING

STATUS OF FORESTS

Beside other benefits, forests are crucial to ensure soil & water conservation and climate regulation. According to the last national assessment conducted in 2004, total area of forests in the country is 4.34 million ha (5.01%), out of which 3.44 million ha forests exist on state-owned lands and remaining on communal and private lands. Underlying causes of low forest cover of the country and high rate of deforestation include arid climate, fast increasing demands for timber, fuelwood, forest lands, and other forest products. Annual consumption of wood (timber and fuelwood) is estimated at 44 million cubic meters whereas annual growth of natural forests is 14.4 mm^3, resulting in overexploitation of forest resources. Moreover, sole dependence of forest-owning local communities on this resource for livelihood is reported as main cause of deforestation. Under Millennium Development Goals (Goal-7), Pakistan had committed to increase forest cover to 6 % by the year 2015, which could not be achieved mainly due to financial constraints of federal and provincial governments. After the 18^{th} amendment in the Constitution and abolition of concurrent list, Federal PSDP grants to provinces for afforestation projects were stopped. Presently, significant programme of afforestation is operational at provincial levels. Overseas Development Assistance (ODA) from either bilateral or multilateral sources has also declined drastically impeding government policies and plans to bring additional lands under tree cover.

Functions of Forestry Wing

After the implementation of 18^{th} amendment, the functions of Forestry Wing according to the revised Rules of Business are as under:

1. National Policy, plans strategies and programmes with regard to ecology, forestry, wildlife, biodiversity, climate change and desertification.
2. Coordination, monitoring and implementation of environmental agreements with other countries, international agencies and fora.

ACTIVITIES RELATED TO NATIONAL PLANNING & COORDINATION

- Facilitating inter-provincial coordination and national planning on forestry, wildlife, biodiversity, wetlands and land management
- Inter-provincial / inter-ministerial tree planting planning, monitoring & reporting
- National policy formulation for Forestry, Wildlife and Biodiversity
- Screening and processing of federal projects for PSDP funding
- Facilitation in GEF and other donor-assisted projects implemented by provinces
- Defence Afforestation Committee
- Houbara Bustard and Migratory Birds Endowment Fund Board
- Pakistan Snow Leopard and Ecosystem Protection Program (PSLEP)
- Involvement in South Asia Vulture Recovery Programme.
- Technical assistance / training & capacity building of provinces
- Ex-situ and In-situ conservation of vultures
- Implementation of Cabinet Decisions, Presidential directives, PM directives, NA Standing Committee, Senate Standing Committee
- Preparation and submission of periodic National Reports to conventions

ACTIVITIES RELATED TO INTERNATIONAL AGREEMENTS

Meeting international obligations of the following Conventions and Protocols:

Convention & Protocol	**Ratification Date**	**Parties**
Convention on Biological Diversity CBD	1994	196
Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)	1987	119

Ramsar Convention on Wetlands	1976	169
CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)	1976	182
UNCCD (United Nations Convention to Combat Desertification)	1997	195
REDD+ (Forestry components of UNFCCC)	Same as UNFCCC	
Nagoya Protocol on Access and benefit Sharing	2016	116
IPBES (Intergovernmental Panel on Biodiversity and Ecosystem Services) Parties are considered as *Members*	2012	132
United Nations Forum on Forests (UNFF)	2000	197

Conventions/Protocols dealt by Forestry Wing

International Agreements

- Liaison with UN / International agencies:
- UN Forum on Forests (UNFF)
- Global Forest Resources Assessment (FRA) of FAO
- FAO Committee on Forestry (COFO)
- UN-REDD+Programme
- Forest Carbon Partnership Facility (FCPF)
- Asia-Pacific Forestry Commission
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- Coordination with international NGOs in joint programs
- Economic Cooperation Organization (ECO)

ONGOING AND NEW INITIATIVES

Ministry of Climate Change is implementing following initiatives towards achievement of objectives of above Conventions and Protocol with the technical and financial support of GEF, UN agencies, World Bank, multilateral donors and NGOs including IUCN & WWF and PSDP.

- Mangrove for the Future (MFF) regional programme in collaboration with IUCN-Pakistan.
- Implementation of World Bank funded REDD+ Readiness Preparation Proposal (R-PP).
- Preparation and implementation of National Biodiversity Strategy & Action Plan (NBSAP).
- Sustainable Forest Management Project

- Revival of forestry and wildlife resources in Pakistan (GPP).
- Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan
- Reversing Deforestation and degradation in high conservation value pine forests in Pakistan.
- Sustainable Land Management Programme to combat desertification in Pakistan (SLMP II)
- Implementation of Federal Forest Policy 2015.

MEASURES TO INCREASE FOREST COVER

Green Pakistan Programme

The "Green Pakistan Programme-Revival of Forestry Resources in Pakistan" was approved by ECNEC on 25.01.2017 at an estimated cost of Rs. 3.652 billion for a period of five years. The main objective of the project is to facilitate transition towards environmentally resilient Pakistan by main streaming notions of adaptation and mitigation through ecologically targeted initiatives covering afforestation, biodiversity conservation and enabling policy environment.

Seasonal Tree Planting Campaigns

In order to enhance tree cover in the country, seasonal tree planting campaigns are held each year. During the period two inter-provincial/inter-ministerial meetings to finalize the targets and strategies for the monsoon and spring tree planting campaigns were held under the chairmanship of Federal Minister & Secretary, Ministry of Climate Change. During the tree planting campaigns all the government departments, private sector organizations, defense organizations and NGOs were involved in planting activities. During 2016-17 inter-provincial meetings on the onset of Monsoon 2016 and Spring 2017 were held whereby achievement against target fixed for tree planting are as follows:

Season	**Target**	**Achievement**	**Survival Rate**
Monsoon 2016	**94.6**	**90.12**	78%
Spring 2017	**257.5**	**201.8**	80%

(*Plants in Millions*)

Mangroves for the Future (MFF)

Mangroves for the Future (MFF) initiative focuses on promotion of an integrated ocean wide approach to coastal zone management. Under this initiative more than 30 projects have been completed since the inception. Extension of the project is under consideration with GCF.

Participation in Reducing Emissions from Deforestation and forest Degradation (REDD+)

Reduced Emission from deforestation and Forest Degradation (REDD+) is a concept adopted by the countries under United Nations Framework convention on climate change (UNFCCC) in 2010. The concept relates to absorption of atmospheric carbon through forest resource. Due to accumulation of carbon in standing trees their financial value increases. Carbon stoked in forest is traded in carbon markets.

The **REDD+ Readiness Preparation Proposal (R-PP)**is being implemented in Pakistan with a grant of USD 3.8 million since July, 2015. Pakistan was awarded the grant through a competitive process by Forest carbon Partnership Facility (FCPF) of World Bank. International and national consultants were hired to prepare documents for the fouraforementioned elements required to complete the REDD+ readiness phase.

Migratory Birds and Houbara Bustard Endowment Fund:

Fund notified on 16.10.2016 to provide support for developing and implementing programs for conservation of valuable migratory bird with an initial endowment of Rs. 250 million.

Convention on Biological Diversity

The Government of Pakistan is firmly committed to take necessary steps in fulfilling its obligations on the issues related to Conservation of Biological Diversity. National consultation on Sixth National Report has been completed and the report will be submitted to Secretariat of Convention on Biological Diversity after approval. National Biodiversity Strategyand Action Plan (NBSAP) has been approved and submitted to Secretariat of Convention onBiological Diversity. National actions towards implementation of NBSAP are well under way:

1) Access and Benefit Sharing (ABS) Law is in process of consultation for wider acceptance.
2) Consultative meetings on ABS with stakeholders is a regular phenomenon and a national workshop was conducted a national interim report on ABS is submitted to the Secretariat of CBD.
3) Astola island was declared as first marine protected area of the Pakistan. Consultation on other potential sites like Churna Island and Miani Horr is in process.

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ATTACHED DEPARTMENTS AND AUTONOMOUS BODIES

i. Pakistan Environmental Protection Agency (Pak-EPA)

Pakistan Environmental Protection Agency was established in 1984 under Pakistan Environmental Protection Ordinance, 1983 and is mandated for the protection, conservation, rehabilitation and improvement of environment, prevention and control of pollution, promotion of sustainable development and for matters connected therewith and incidental thereto. Pakistan is continuously facing the challenge of achieving environmentally sustainable development. This has become difficult to achieve in the backdrop of domestic and international pressure compounded with internal law and order situation. While remaining mindful of the challenges of environmental compliance primarily in areas of municipal and industrial pollution Pak-EPA has strived to bring improvement. After 18th constitutional amendment the subject of environment have been devolved to the provinces. Pak-EPA is looking after the matters of environmental pollution in Islamabad Capital Territory (ICT).

The following major activities were carried out during the period 2016-17 by different directorates of Pak-EPA.

1. Directorate of Lab/NEQS

- Monitoring activities conducted by lab section during period 2016-17 are as under:
    - Inspection of different industries in ICT in order to check the environmental issues and the pollution created by the industrial units of Industrial sector, Islamabad.
    - Monitoring of D.G. khan Cement Company, Khairpur District was carried out to check the emissions due to the use of TDF (Tyre Derived Fuel).
    - Monitoring of 15 sites of CNG/ petrol pumps for their installment between August 2016 and December, 2017 before issuing certification.

- Monitoring of Hussain traders, Blue Area, Islamabad for the complaint against dust due to refilling of toners with dry ink powder.
- Monitoring of CDL Railway workshop for the usage of banned tetra chloro ethylene imported from China.
- Monitoring of environmental solution lab, I-10 before issuing certification.
- Monitoring of PIMS hospital to check the status of hospital waste management.
- Inspection of Parliamentarian Enclave, Zone-V for EIA.
- Inspection of Vehicular emissions in Islamabad with the cooperation of Islamabad Traffic Police.
- Approximately 100 students were entertained for the purpose of research and internship from environmental departments of Fatima Jinnah University, International Islamic University and NUST.

2. Directorate of Legal/Enforcement

- During the period 2016-17, 15 Environmental Protection Orders (EPO) were issued to violators including CDA, ICT, Developers and industrial units under section 16 (2) of Pakistan Environmental Protection Act, 1997.

- During the same period, 48 legal notices were issued to the offenders/ violators of Pakistan Environmental Protection Act, 1997 and Personal Hearing of the violators were conducted in 45 cases.
- 05 Environmental cases were filed in the Environmental Protection Tribunal (EPT), Islamabad out of which 02 were penalized through EPT by Pak-EPA equivalent to Rs. 250,000/-. Whereas, warning issued to PIMS through EPT for non-compliance of Hospital Waste Management Rules and non-installation of incinerator.
- Proceedings/litigation were attended on environmental related issues in Supreme Court, High Court, Civil Court and Environmental Protection Tribunal by this section on routine basis.
- Draft Pakistan Environmental Protection "Motor Vehicle Regulations, 2016" under section 33 of Pakistan Environmental Protection Act, 1997 and "Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, 2016" was prepared by the section.

3. Directorate of Environmental Impact Assessment (EIA/IEE)

- During the period 2016-17, eight (08) Initial Environmental Examination (IEE) Reports have been received for review at this Agency, seven (07) have been granted environmental approval and one (01) case is under process.
- During the same period, six (06) Environmental Impact Assessment (EIA) Reports have been received in the Agency, five (05) have been granted environmental approval and one (01) case is under process.
- During the same period, four (04) Petrol Pumps cases have been received in the Agency, three (03) have been granted environmental approval and one (01) case is under process.
- Thirteen (13) Monitoring visits have been carried out.
- Five (05) Public Hearings have been conducted.

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ii. Zoological Survey of Pakistan (ZSP)

Zoological Survey of Pakistan (ZSP) is an attached department of Ministry of Climate Change, Islamabad and is one of the key Federal Agencies to be involved in development of National Biodiversity Strategy.

Biodiversity and Ecological Services have direct and indirect impacts on the economy and other fields of life. Human impact on the ecosystem and on faunal biodiversity is immense in Pakistan. These warrant proper surveys for data collection on wildlife species which, in turn, will determine the priorities for conservation of biological resources. Such studies facilitate in introducing viable measures for conservation and will ultimately help in poverty alleviation particularly in the remote areas. ZSP is mandated:

- To acquire information on distribution, population dynamics and status of fauna of Pakistan.
- To provide recommendations to policy makers on wildlife conservation, management, export and import.
- To set up and maintain standard Zoological collections for reference in Natural History Museum.
- To impart trainings and create awareness about fauna conservation.
- Undertake research on ecology, biology physiology and biochemistry of important fauna of Pakistan.
- To advice government on all zoological matters including conservation, management, export and import of wildlife.

  During the Financial Year 2016-2107 Zoological Survey of Pakistan Carried out following activities.

1. Survey of Endangered Species of Wildlife

The Indus River dolphin (Platanista gangetica minor), locally known as *bhulan is an endangered species.* The current distribution range of the Indus River dolphin is about a 1,000 km stretch of the Indus River which includes the main Indus channel and active channels connected to it between Jinnah and Kotri Barrages.

Objectives:

During the field census in 2006, 2 dolphins were sighted in 70km stretch of Jinnah to Chashma Barrage. Current census was carried out to confirm the presence or otherwise of the species in the area, identifying the key threats and monitor the suitability of habitat for Indus River Dolphin. Study also had the objective to check the feasibility of area to relocate the dolphins from lower reaches where carrying capacity is being exceeded. Census was collectively conducted by Zoological Survey of Pakistan, Punjab, Sindh and KPK Wildlife Departments and WWF Pakistan.

Results:
During a 3-day effort to record the Indus River Dolphin in study region, there was no success in recording any single specimen. Despite the available habitat, Indus River Dolphin is no more inhibiting the 70km stretch of Jinnah to Chashma Barrage. Moreover, no prominent threats were recorded along the river. There were occasional settlements, fishing boats and motor-powered boats for transportation.

Historically, Indus River Dolphin inhabited the area but with fragmenting habitat, it shifted to lower reaches of River Indus. There are multiple factors contributing to the absence of the species in the area. Water quality and food availability is one of the key factors. Fish is basic diet of Indus River Dolphin. Physico-chemical properties of water may greatly affect the fish diversity and abundance resulting in depleted food resource.

2. Mid-Winter Waterfowl Census

Mid-winter waterfowl census is annual activity of the department since 1982 and that is carried-out in the second week of the January which is required by the International Wetlands Research Bureau or Wetlands International. During the current FY following wetlands were visited for waterfowl census: Sukkur Barrage, Chotiari dam, Manchar, Lungh, Drigh, Hmmal, Mehrano Anwar Shah, Nurri, Phoosna lakes of Sindh, KallarKahar, Namal, Ucchali, Jhallar lakes in Salt Range and Chashma, Jinnah and Rasool Barrage in Punjab.

Among the migratory water birds the Common Coot (*Fulica atra*) was observed most common species at all the wetlands of Punjab province. Highest number of Common Coot was observed at Chashma Barrage and Ucchali lake. From duck family Common Teal (*Anas crecca*) and Common Pochard (*Aythya ferina*) were found most abundant ducks. The results show a significant variation in population density of migratory water birds at all the surveyed wetlands of Punjab. The Chashma Barrage once was hotspot for thousands of migratory water birds has now only few thousand in numbers. This is due to anthropogenic activities at the wetland.

Whereas at wetlands of Sindh there was no significant variation in migratory water bird population was observed. The Common Teal (*Anas crecca*) was found most common at all the wetlands of Sindh followed by Common Coot (*Fulica atra*). The Grey Lag Goose (*Anser anser*) which is a rare species of migratory ducks was observed at Hammal Lake. Nurri Lake had largest population of migratory water birds i.e., more than one lake water birds.

3. Publications

The department is regularly publishing scientific Journal "Records Zoological Survey of Pakistan" and Brochures, Charts etc.

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iii. Global Change Impact Studies Centre (GCISC)
(A Body Corporate established under the GCISC Act 2013)

Global Change Impact Studies Centre (GCISC) was first established as a development project in April 2002, with the mandate to undertake research on climate change and its impacts and potential remedies. Subsequently, GCISC's status was formalized through the passage of the GCISC Act 2013 by the Parliament (notified vide Gazette of Pakistan on 26 March 2013 as Act No. XVII of 2013). The Act defines GCISC as a body corporate governed by an independent Board of Governors (BoG), which is chaired by the Federal Minister in-charge of the concerned Ministry dealing with the subject of climate change.

1. Mission Statement

To undertake scientific investigations of the phenomenon of climate change at regional and sub-regional levels and study its impact on various sectors of socio-economic development in order to prepare the country to meet threats to its water resources, agriculture, ecology, energy, health, bio-diversity etc.

2. Main Functions

Under the GCISC Act, the Center is tasked with three functions, namely research, capacity building, and outreach and awareness:

a. **Research**: the research program is driven by national policy goals, namely protecting people against the impacts of climate change, promoting economic growth and sustainable development in a climate-constrained future, and honoring Pakistan's international commitments. To these ends, research is organized in three groups:

- ***Climatology*** **and Environment**:usingclimate system models to predict future climate behavior in Pakistan, including monsoons, temperature, precipitation, and climate extremes.

- ***Water Resources*** **and Glaciology**: using glacio-hydrological and water models to assess future behavior of glaciers, aggregate and seasonal flows in the Indus Basin System, and changes in watershed behavior.

- ***Agriculture, Forestry & Land Use****:* use of crop simulation & water management modeling to predict the impact of projected changes in temperature, precipitation, and water availability on Agriculture, Forestry and Land Use.

b. **Capacity building**: imparting technical and communication skills to GCISC staff as well as students and climate scientists at other national research organizations and universities.

c. **Dissemination of research findings**: to the scientific community, planners, policy makers, and to the public at large, in order to raise awareness of climate change among policymakers as well as the citizenry.

3. Ongoing Research Activities

I. Climatology & Environment Section

- Assessment of past climate changes in various parts of Pakistan using statistical analysis techniques;
- Projection of future climate changes over Pakistan and its various regions based on:
  - i). analysis of the outputs of a suite of Global Circulation Models (GCMs)
  - ii). dynamical downscaling of the data sets of coarse resolution GCMs using state-of-the-art regional climate models (RCMs)
  - iii). employing statistical downscaling techniques.

- Study the extreme climate and weather events using simulation models and development of indicators and indices for climate extremes over Pakistan. Development of methodological tools for projecting future frequency & intensity patterns of extreme events;
- Development of seasonal, inter-annual and decadal climate predictability systems; Predictability of Asian Summer Monsoon System;
- Updating of GHG Inventory of Pakistan for Energy & Industry Sectors;
- Analysis of alternative Energy Sector Strategies for Pakistan in relation to GHG and other pollutant emissions.

II. Water Resources & Glaciology Section

- Climate change analysis for the high elevation Karakoram region;
- Analysis of early 21st century changes in Kabul Basin Hydro-glaciology;
- Spatio-temporal assessment of climate change impacts on the UIB- cryosphere and variability of flows based on high resolution climate model data;
- Analysis of climate impact on the frequency and intensity of hydrological extreme events;
- Plausible Adaptation strategies to ensure country's water security under the umbrella of Climate change and Water policies.

III. Agriculture, Forestry and Land Use Section

- Assessment of the impacts of projected climate change on productivity of key agricultural crops in different climatic zones using crop models;Assess impacts on related areas, including productivity of forestry, grasslands, rangelands and fragile ecosystems (i.e., mountains, wetlands, coasts, and arid areas); livestock; and land degradation and deforestation, insect-pest infestation dynamics; Food security in the face of future climate change and especially under reduced availability of irrigation water; Adaptation measures, including smart agriculture; Studies on water, food, energy nexus;
- Updating GHG emissions from agriculture and related sectors.

4. Achievements and Progress of GCISC:

Since its inception, GCISC has produced over 120 scientific papers and official reports, collaborated with national and international institutions, contributed to the work of prestigious international scientific panels, and provided advice to the government on national policies as well as international commitments.

The following is a summary of the accomplishments in 2016-17. In case of joint authorship, the name of the GCISC researcher is in **bold** script.

5. Research papers in International / National Journals & Book (13):

i. **Aftab. A, M Ijaz**, J. Muhammad, **M.A. Goheer**, G. Akbar and **M. Adnan** (2017). Climate Change Implications for Wheat Crop in Dera Ismail Khan District of Khyber Pakhtunkhwa Pakistan Journal of Meteorology Vol.13, Issue 25, page 17-27, ISSN 1810-3979.

ii. Almazroui, Mansour, Nazrul Islam, M., Balkhair, Khaled S., Sen, Zekai, **Masood, Amjad**, (2017) Rainwater harvesting possibility under climate change: A basin-scale case study over western province of Saudi Arabia, **Atmospheric Research**,189(2019), 11-23 doi:10.1016/j.atmosres.

iii. Khalil Ur Rahman, Khaled S. Balkhair, Mansour Almazroui, **Amjad Masood**, (2017) Sub-catchments flow losses computation using Muskingum-Cunge routing method and HEC-HMS GIS based techniques, case study of Wadi Al-Lith, Saudi Arabia, Modeling Earth Systems and Environment Journal3:4, DOI 10.1007/s40808-017-0268-1.

iv. Bushra Khalid, Cholaw Bueh, Shumaila Javeed, **Shaukat Ali**, Qaiser Sultana and Ayesha Khalid, (2016):An Application of Single Model Ensemble System for Seasonal Prediction of Winter Temperature for Islamabad and Lahore using Coupled General Circulation Models. Journal of Weather. Vol. 99, No. 99, DOI: 10.1002/wea.2832.

v. Gul, C., Kang, S. C., Ghauri, B., Haq, M., Muhammad, S., &**Shaukat Ali**. (2017). Using Landsat images to monitor changes in the snow-covered area of selected glaciers in northern Pakistan. *Journal of Mountain Science*, 14(10), 2013-2027.

vi. **Muhammad Adnan**, **Nadia Rehman**, **Muhammad Munir Sheikh**, **Aftab Ahmad Khan**, **Kaleem Anwar Mir** and Muhammad Ahson Khan. (2016). "Influence of Natural Forcing Phenomena on Precipitation of Pakistan", Pakistan Journal of Meteorology. Vol. 12, Issue 24: 23-35.

vii. **Adnan M.**, **Rehman N.**, Shahbir J., "Predicting the Frequency and Intensity of Climate Extremes by Regression Models" J. Climatol. Weather Forecasting, 2016, 4(3):185. Doi:10.4172/2332-2594.1000185.

viii. **Kaleem Anwar Mir**, Pallav Purohit, Gary A. Goldstein, Rajasekhar Balasubramanian (2016) "Analysis of baseline and alternative air quality scenarios for Pakistan: an integrated approach", Environ Sci Pollut Res. doi:10.1007/s11356-016-7358-x.

ix. Azharuddin, S., and **Dogar, M. M.** (2016). Decadal climate variability and predictability. CURRENT SCIENCE, 110(8), 1397-1398.

x. Osipov, S., **Dogar, M.,** and Stenchikov, G. (2016, April). Study of Regional Volcanic Impact on the Middle East and North Africa using high-resolution global and regional models. Geophysical Research Abstracts, Vol. 18, EGU2016-8617, 2016.

xi. Khan, F. · P, Jürgen and **Ali, S.** (2016). Improved Hydrological Projections and Reservoir Management in the Upper Indus Basin under the Changing Climate. Water and Environment Journal. DOI: 10.1111/wej.12237. ISSN 1747-6585.

xii. **Khan, A. A.**, J. Muhammad, G. D. Khan, **M. Ijaz** and **M. Adnan**, (2016). Quantitative Analysis of Watershed Hydrology for Kandar Dam (Kohat) using Remote Sensing and Geographic Information System (GIS) Techniques, Pakistan Journal of Meteorology, 12(24):15-22.

xiii. Kamran, A., **M. A. Goheer,** K. Saifullah and s. Amir (2016) Cooperation of Harnessing Benefits of Transboundary Water in Indus Basin. Compendium of Research Studies 'Water Cooperation through Leadership and Institutional Development' compiled by LEAD Pakistan.

6. Technical Research Reports (4):

i. INDC-MoCC-GoP (2016), Pak-INDC Submitted to UNFCCC, a joint effort of Global Change Impact Studies Centre (GCISC), Ministry of Climate Change and other Government Agencies. https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf;

ii. Nuzba Shaheen and Muhammad Arif Goheer (2016) Technical Report of the project on Climate smart agriculture through sustainable water use management: Exploring new approaches and devising

strategies for climate change adaptation in South Asia submitted to Asia Pacific Network for Global Change Research, Japan;

iii. Ali, S., Eum, Hyung-Il., (2016): Multi-climate model climatic extremes, hydrological scenarios projections and associated uncertainties over Pakistan;

iv. Kaleem Anwar Mir and Muhammad Ijaz. (2016). Greenhouse Gas Emission Inventory of Pakistan for the Year 2011-12, GCISC-RR-19, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan.

7. Scientific Contribution Presentations in International Conferences and Workshops (16):

i. Muhammad Arif Goheer delivered a presentation on 'GHG emissions from Rice Cultivation in Pakistan' in the Rice Working Group during 1st Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 7-9 June 2017, Bilbao, Spain;

ii. Shaukat Ali delivered a presentation on 'Statistical downscaling using long-term trend preserving bias correction methods (DQM and QDM), for extreme climatic and hydrological events over Pakistan' in The Third workshop on Atmospheric Composition and the Asian Monsoon (ACAM), 5-12 June 2017, China;

iii. Shaukat Ali (2017) presented on Quantile delta map for statistical downscaling of climate model data", delivered at Asian Monsoon meeting organized by National Center for Atmospheric Research (NCAR) United State of America and Institute of Atmospheric Physics (IAP) China on 11 June 2017;

iv. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on 'How the KKH Region be better represented in the IPCC' in the workshop on Understanding Climate Change and Enabling Climate Actions with a Special Focus on Mountain Systems of the Hindu Kush Himalayas, April 2017, Nepal;

v. Amjad Masood participated in International Seminar on "Managing Indus Basin for Sustainable Development, Food Security and Poverty Alleviation" at CEWRE UET, Lahore-13 Apr 2017;

vi. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on 'Future Runoff Scenarios using Statistically Downscaled RCM data in Hydrological Modelling' in APN Project 'Runoff Scenario and Water Based Adaptation Strategies in South Asia (ARCP2012-SP29-Shrestha)' related activity, March 2017, Nepal;

vii. Nuzba Shaheen delivered a presentation on Climate Smart Agriculture: Using Best Practices for adaptation and Mitigation in Asia in Capacity Building Workshop and Science-Policy Dialogue on Climate Change: Low Carbon and Adaptation Initiatives in Asia 06-08 February 2017, February 2017, Thailand;

viii. Shahbaz Mehmood contributed in Regional Level Sharing Workshop for the Project Runoff Scenario and Water Based Adaptation Strategies in South Asia (ARCP2012-SP29-Shrestha), February 2017, Bangladesh;

ix. Muhammad Arif Goheer contributed to the negotiations on Agriculture, Forestry & Land Use and Adaptation streams in the 22nd Session of Conference of Parties (COP-22) as a Government delegate from 7-19 November 2016, Marrakesh, Morocco;

x. Muhammad Arif Goheer contributed to the negotiations with Coalition for Rainforest Nations (CfRN) during COP-22 which led to the acquisition of country membership in coalition and engagement of Pakistan in Reporting for Results Based REDD+ activities under CfRN;

xi. Kaleem Anwar Mir, Participated as energy sector review expert in the "In-country review of Malta's 2016 GHG submission", October 2016, Malta;

xii. Muhammad Amjad, (2016) "Generation of Regional Climate Data and Research in Pakistan" presented at APCC Training Program 2016 on Generation of Regional Climate Data derived from Statistical Downscaling Techniques during 22 – 27 August 2016 at APCC, Busan, Republic of Korea;

xiii. Arif Goheer delivered a presentation on 'Preparation of Pakistan's INDC' in Workshop on 'Unpacking (I)NDCs- identifying, prioritizing, planning and implementing mitigation and adaptation measures' organized by International Partnership on Mitigation and MRV in association with Department of Meteorology, Hydrology and Climate Change (DMHCC), 26-27 July 2016 in Ha Noi, Vietnam;

xiv. Arif Goheer moderated a session on 'Developing an Action Plan for a Cross-Cutting Sector with Data Limitations' in the Workshop on 'Unpacking (I)NDCs-identifying, prioritizing, planning and implementing mitigation and adaptation measures' organized by International Partnership on Mitigation and MRV in association with Department of Meteorology, Hydrology and Climate Change (DMHCC), 26-27 July 2016 in Ha Noi, Vietnam;

xv. Shaukat Ali (2016) delivered a presentation at International Conference on Challenges in Water Security to meet the growing Food requirement organized by AASSA (Association of Academies and Societies of Sciences in Asia and PAS (Pakistan Academy of Sciences), 19-21 July 2016;

xvi. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on "GLOF- the main drives and how to respond' in Regional Conference on Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia, July 2016, Sri Lanka.

8. Scientific Contribution Presentations in National Conferences and Workshops (35):

i. Aftab Ahmad Khan, Tahir Burhan and Muhammad Arif Goheer delivered a presentation on Assessment of Spatial and Temporal Variations of Soil Salinity

Using Combination of Remote Sensing/GIS and Field Methods in Lakki Marwat on 26 May 2017, Islamabad;

ii. Aftab Ahmad Khan participated in Training Workshop on Spring-shed Management in HKH Region at NARC/ PARC Islamabad from 17-19 May 2017;

iii. Muhammad Ijaz delivered a seminar on Estimating Pakistan's GHGs emissions with particular focus on Agriculture sector, at GCISC- 12 May 2017, Islamabad;

iv. Muhammad Zia-ur-Rahman Hashmi participated in 2-day workshop on, 'Climate Vulnerability Assessment and Adaptation of Water Systems' held from May 11-12, 2017 at USPCASW, MUET, Jamshoro;

v. Muhammad Arif Goheer delivered a talk on Climate Change and its Implications for Pakistan Agriculture to FAO Mission to Pakistan for the Formulation of Climate Smart Agriculture Project under Green Climate Fund-4 May 2017;

vi. Syed Mehmood Nasir-First International Conference on Climate Change & Biodiversity by The Islamia University of Bahawalpur-2-4 May 2017;

vii. Muhammad Arif Goheer-Launching Ceremony of Civil Society Coalition for Climate Change (CSCCC) at Serena-3 May 2017.

viii. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on Responding to Climate Change in the HKH: Experiences from the recent IPCC Outreach Event in Kathmandu. Nepal, in GCISC Friday Seminar on 28 April 2017, Islamabad;

ix. Muhammad Amjad delivered a presentation on Climate Change, Sustainable Development Goals and Citie, on 14 Apr 2017, Islamabad;

x. Nadia Rehman delivered a seminar on Our Planet: Addressing Regional Effects of Extreme Weather Events at GCISC, Islamabad on 7 Apr 2017;

xi. Arif Goheer delivered a presentation on 'Climate Change Challenges to Food Security in Pakistan: Prospects of Sustainability in Production and Consumption' in the Conference on Contemporary issues in Biosciences organized by University of Wah on 29 March 2017;

xii. Muhammad Zia-ur-Rahman Hashmi contributed in National workshop on Pakistan's Achievement of Water Related SDGs was held at the Pakistan Council of Research in Water Resources (PCRWR) from 14-15 March 2017;

xiii. Muhammad Adnan and Nadia Rehman (2017), "Climate Extremes and Desertification Trends over Pakistan in Context of Climate Change", in First International Conference on Emerging Trends in Earth and Environmental Sciences (ETEES), 09-10 March, 2017, College of Earth and Environmental Sciences, University of Punjab, Lahore, Pakistan;

xiv. Shaukat Ali, M. Adnan, Nadia Rehman, et al (2017), "Future Changes in Drought Characteristics over Pakistan Using Standardized Precipitation Index (SPI): 1970-2099". in First International Conference on Emerging Trends in Earth and

Environmental Sciences (ETEES), 09-10 March, 2017, College of Earth and Environmental Sciences, University of Punjab, Lahore, Pakistan;

xv. Syed Mehmood Nasir participated in two day's workshop on Transboundary Water Governance "Raising awareness and capacity of civil society on transboundary water governance in India and Pakistan" by WWF-Lahore-7-8 Feb 2017;

xvi. Shahbaz Mehmood (2017), delivered a presentation as Keynote Speaker titled "Climate Change: Past Trends and Development of Future Projections using Climate Models for Impact Assessment Studies", at 1st International PAEC-CIRP Joint Seminar on "Atmospheric Dispersion of Effluents and Radiological Consequences Assessment for Single & Multiple Units NPPs" being held at PNRA Islamabad, January 03 – 05, 2017;

xvii. Shahbaz Mehmood (2017), delivered a talk as Resource Person on Climate Change Scenarios; Challenges & Opportunities, one-day workshop on "Climate Change Scenario in Pakistan, Issues and Solutions organized by Welfare Council-Islamabad;

xviii. Arif Goheer delivered a talk on 'Pakistan's Intended Nationally Determined Contributions (INDCs)', in GCISC In-house Seminar on 30 December 2016;

xix. Amjad Masood delivered a presentation on Climate Change Impacts on Water Resources of Saudi Arabia (Case Study of Wadi Al Lith), at GCISC, Islamabad on 23 December 2016;

xx. Arif Goheer contributed as resource person for the Training Course on Climate Change Implications and Adaptation for Rural Areas organized by Akhtar Hameed Khan National Centre for Rural Development (AHK NCRD), from 19-23 December 2016 in Islamabad and delivered presentation on 'Impacts of Climate Change on Agriculture and Adaptation Prospects';

xxi. Aftab Ahmad Khan and Nuzba Shaheen contributed in Mid Term Workshop AgMIP, TOA-MD, R-Script and SPSS Training at University of Agriculture Faisalabad-20-22 Dec 2016;

xxii. Muhammad Arif Goheer delivered a talk on Negotiating Climate Change: COP-22, From Agreement to Implementation in Friday Seminar at GCISC, Islamabad on 16 December 2016;

xxiii. Nuzba Shaheen presented on Use of open access climate change scenario data sets by impact modelers: Issues and concerns at GCISC, Islamabad on 9 December 2016;

xxiv. Syed Mehmood Nasir and Muhammad Arif Goheer delivered a Seminar by on "Recent developments in UNFCCC COP22" at PIDE Islamabad on 07 December 2016;

xxv. Aftab Ahmad Khan-Participation in "National Conference on Thinking Climate Change Adaptation in Water and Farming THINK-ADAPT" by Climate Change Centre Agriculture University Peshawar-28-30 Nov 2016;

xxvi. Muhammad Adnan delivered a presentation on Monsoon Variability and Predictability in Pakistan in the context of Climate Change at GCISC, Islamabad on18 Nov 2016;

xxvii. Muhammad Zia-ur-Rahman Hashmi participated in Technical dialogue in Fall School on Water Science, governance and policy LUMS Lahore 7-9 November 2016;

xxviii. Aftab Ahmad Khan delivered a presentation on Potential Rain Water Harvesting Solutions in Thar Desert Areas of Pakistan Using Geo-Spatial techniques in Friday Seminar at GCISC on 04 Nov 2016;

xxix. Muhammad Zia-ur-Rahman Hashmi contribute to WEF National Conference Islamabad on Water & Environment: Sustainable Development in Changing Climate by MoCC, World Bank, ICIMOD & Water Environment Forum-17-19 Oct 2016;

xxx. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-Meeting on Concerning USAID/USACE Climate Change Training with US Embassy Officials at MoCC-14 Oct 2016;

xxxi. Arif Goheer delivered a talk on 'Climate Change and its Implications for Food and Water Security in Pakistan' in Training Course on Natural Resource Management organized by Akhtar Hameed Khan National Centre for Rural Development (AKH-NCRD), Islamabad from 03-05 October 2016;

xxxii. Arif Goheer delivered a presentation on 'Pakistan's Greenhouse Gas Emission Inventory 2015- Key Highlights' in Stakeholders' Consultation workshop on Pakistan INDC Study organized by GCISC and Ministry of Climate Change on August 29, 2016, Islamabad;

xxxiii. Aftab Ahmed Khan contributed to the Training Workshop on Carbon Sequestration, 1-3 June, 2016, WWF, Islamabad;

xxxiv. Shaukat Ali (2016), delivered a seminar at COMSATs Islamabad on April 12, 2016 titled "Future Earth and CORDEX applications for Asia";

xxxv. Aftab Ahmad Khan participated in training workshop on Application of GIS and remote sensing on Agriculture in Pakistan, Arid University Rawalpindi 25-28 Mar 2016;

9. Books, Monographs and Published Proceedings of Important Conferences and Workshops (6):

i. Mir, K.A., and Balasubramanian, R. (2017). Air quality improvement and greenhouse gas mitigation in Pakistan: an integrated approach. In L. L. Heng, N. Harvey, K. Sekhar, Y. W-Shan & S. J. Gek-khim (Eds.), Sustainability matters: environmental management in the Anthropocene (pp. 189 – 210). Singapore, SG: World Scientific Publishing. DOI: https://doi.org/10.1142/9789813230620_0007;

ii. Shaukat Ali, Bushra Ghaffar, Kayyanat Shafiq, Jaziba Ishtiaq, Iqra Sarfraz, Nadia

Khan, Muhammad Adnan, Aftab Ahmad Khan, Kaleem Anwar Meer, Firdos Khan, Muhammad Shahbaz and Muhammad Arif Goheer (2017) abstract on Future Changes in Drought Characteristics over Pakistan Using Standardized Precipitation Index (SPI): 1970-2099 published in the Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;

iii. Muhammad Adnan and Nadia Rehman (2017) abstract on Climate extremes and desertification trends in context of climate change published in Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;

iv. Kaleem Anwar and Shahbaz Mehmood (2017) abstract on Pakistan's Energy Sector's Greenhouse Gas Emissions published in the Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;

v. Muhammad Zia-ur-Rahman Hashmi and Qurat ul Ain Ahmad (2016). Mid-term progress report of Year-II. APN Project "Runoff Scenarios and Water Based Adaptation Strategies in South Asia" (ARCP2013-20NMY-Shrestha);

vi. Nuzba Shaheen and Muhammad Arif Goheer (2016) Proceedings of the Regional Training Workshop on 'Use of Statistical Downscaling and AquaCrop Simulation Modeling Tools for Climate Change Impact Studies' organized under APN Project on Climate Smart Agriculture through Sustainable Water Use Management' 30 May – 04 June 2016, Kandy, Sri Lanka.

10. Organization of Scientific Activities at International / National Level (6):

i. 1st Stakeholders' Consultative Meeting on Pakistan's Glaciers Threats Study, GCISC, Islamabad, Mar 10, 2017;

ii. GCISC organized a Spring Tree Plantation Campaign 2017 under Prime Minister's Green Pakistan Program at Emigration Tower in collaboration with D.G Bureau of Emigration & GCISC-9 Feb 2017;

iii. Pak-INDC Steering Committee Meeting organized jointly by MoCC and GCISC on October 27, 2016, Islamabad;

iv. Stakeholder Consultation on Pakistan INDC Study organized jointly by GCISC & MoCC on 29 August 2016, Islamabad;

v. Pak-INDC Steering Committee Meeting organized jointly by MoCC and GCISC on September 19, 2016, Islamabad;

vi. Organized a meeting of Sector Experts contributing to Pak-INDC study on August 17, 2016, Islamabad.

11. Effort on capacity building of GCISC young scientists through academic and specialized trainings and participation conferences, workshops etc at International level (10):

i. Muhammad Ijaz, First Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, 12-14 June 2017, Bilbao, Spain;

ii. Muhammad Arif Goheer, participated in 1st Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 7-9 June 2017, Bilbao, Spain;

iii. Qurat-ul-Ain Ahmad, HI-AWARE PhD Academy, 21-25 November 2016, Kathmandu, Nepal;

iv. Aftab Ahmad Khan participated in Iinternational Conference & Exhibition "Advanced Geospatial Science & Technology" held from 18-20 October 2016 at Tunis, Tunisia;

v. Muhammad Ijaz, Workshop on the Building of Sustainable National GHG Inventory Management Systems, and the use of the 2006 IPCC Guidelines for National GHG Inventories for the Asia-Pacific and Eastern European Regions, 5-9 September 2016, South Korea;

vi. Muhammad Amjad, APCC Training Program 2016 on "Generation of Regional Climate Data derived from Statistical Downscaling Techniques" being organized by Asia-Pacific Economic Cooperation Climate Centre (APCC), 22-27 August 2016, Bosan, South Korea;

vii. Shahbaz Mehmood participated in Understanding Climate Change and Enabling Climate Actions with a Special Focus on Mountain Systems of the Hindu Kush Himalayas, 11-13 April 2017, Kathmandu, Nepal;

viii. Nuzba Shaheen participated in 4th SEACLID/CORDEX Southeast Asia Project Workshop and Empirical-Statistical Downscaling (ESD) for CORDEX Asia, 23-25 November 2016, Hanoi, Vietnam;

ix. Muhammad Arif Goheer participated in the in the 22nd Session of Conference of Parties (COP-22) as a Government delegate from 7-18 November 2016, Marrakesh, Morocco;

x. Nadia Rehman, Our Planet: Addressing Regional Effects of Extreme Weather Events, 4-25 March 2017, USA.

12. Effort on capacity building of GCISC young scientists through academic and specialized trainings and participation conferences, workshops etc at National level (35):

i. Muhammad Arif Goheer - Consultation as INDC Roadmap Preparation at MoCC on 12 July, 2016;

ii. Muhammad Zia-ur-Rahman Hashmi & Aftab Ahmad Khan participated in Short Course on "Remote Sensing and GIS Training on Flood Modelling", NUST H-12 Sector Campus, Islamabad, 18 - 29 July 2016;

iii. Muhammad Amjad - Second Learning Session on Urban Resilience Under the 2016 LEAD Leadership Development Programme (LDP) on 25-29 July 2016 at Karachi;

iv. Muhammad Zia-ur-Rahman Hashmi - Meeting of Disaster Risk Management Implementation Committee – Climate Change Division on 23 August 2016 Conference Room (220-E)-NDMA;

v. Muhammad Arif Goheer, Shahbaz Mehmood, Muhammad Ijaz & Kaleem Anwar Mir participated in Stakeholders Consultation Workshop on Pakistan INDC Study at Marriott Hotel Islamabad on 29 August 2016;

vi. Aftab Ahmad Khan-APSIM Training, Agriculture University Faisalabad on 28-30 August 2016;

vii. Muhammad Arif Goheer & Shahbaz Mehmood - Talk by Prof. Bothum on "Climate Change and the changing monsoon pattern at COMSTECH on 07 September 2016;

viii. Muhammad Arif Goheer - Consultative Workshop on Legal Preparedness for REDD+ at FAO Office Islamabad, 29 September 2016;

ix. Muhammad Arif Goheer - INDC Steering Committee Meeting at MoCC on 5th October 2016;

x. Aftab Ahmad Khan - Fall School on Water Science, Governance and Policy at LUMS on 7-9 November 2016;

xi. Muhammad Arif Goheer - Meeting of National Working Groups on REDD+ at Grand Regency Hotel Islamabad on 22-23 November 2016;

xii. Muhammad Amjad - SDPI's Nineteenth Sustainable Development Conference (SDC) at Marriott Hotel Islamabad on 6-8 December 2016;

xiii. Shahbaz Mehmood & Qudsia Zafar - 1st International PAEC-CIRP Joint Seminar on "Atmospheric Dispersion of Effluents and Radiological Consequences Assessment for Single & Multiple Units NPPs at PNRA HQ on 03-05 January 2017;

xiv. Muhammad Arif Goheer - Consultative Workshop on University-Industry Collaborative Interactions: Policy and Practical Implications for Pakistan at PCST on 4th January 2017;

xv. Muhammad Zia-ur-Rahman Hashmi - Consultative Workshop on Impact of Climate Change on Water Resources of Pakistan and Mitigation Options on 11 January 2017 at PEC HQs Islamabad;

xvi. Muhammad Arif Goheer - LEAD Pakistan National Consultation on Pakistan Water Challenge at Marriot Hotel, Islamabad on 8 February 2017;

xvii. Syed Mehmood Nasir, Muhammad Arif Goheer & Muhammad Zia-ur-Rahman Hashmi - Pakistan's Glacier Threats Study at MoCC on 14-15 February 2017;

xviii. Muhammad Arif Goheer - Inception Workshop for REDD+NFMS/MRV/FREL/FRL and REDD+ Strategy Development and Implementation Framework at Hill View Hotel, Islamabad on 13-14 February 2017;

xix. Muhammad Arif Goheer, Shahbaz Mehmood & Ms. Qudsia Zafar - "Stakeholders Workshop on Forests, Biodiversity, Climate Change and Ecosystem Service for USAID Strategic Planning" at Serena Hotel, Islamabad on 15 February 2017;

xx. Muhammad Adnan, Shaukat Ali & Kaleem Anwar Mir - First International Conference on Emerging Trends in Earth and Environmental Sciences (ETEES17) on 08-10 March 2017 at Lahore;

xxi. Shahbaz Mahmood & Muhammad Zia-ur-Rahman Hashmi - Visit of Expert Team from International Centre for Water Hazard and Risk Management (ICHARM), Japan to PMD at PMD Islamabad on 2-3 March 2017;

xxii. Muhammad Arif Goheer, Shahbaz Mehmood & Muhammad Zia-ur-Rahman Hashmi - Meeting on Pakistan's glacier threats study at Committee Room on 10 March 2017;

xxiii. Shaukat Ali - One Day Symposium "Advances in Earth Sciences and Climate Change" at Abbottabad University of Science and Technology (AUST) on 20 March 2017;

xxiv. Muhammad Arif Goheer & Muhammad Amjad - LEAD-Invitation for national workshop on 'Forging Partnerships for Climate Compatible Development in Pakistan at Marriot Hotel, Islamabad on 21 March 2017;

xxv. Muhammad Zia-ur-Rahman Hashmi - PCRWR "National Experts Consultative workshop on Integrated water resource management and rain water harvesting in Punjab Barani Tract" at PCRWR, Islamabad on 27 March 2017;

xxvi. Muhammad Arif Goheer - GCISC presentation in the Radio Pakistan programmes on the topic of climate change at Radio Pakistan on 28 March 2017;

xxvii. Muhammad Arif Goheer - Conference on 'Contemporary Issues in Biosciences at University of Wah, Wah-Cantt on 29 March 2017;

xxviii. Muhammad Arif Goheer & Muhammad Ijaz - Review of Greenhouse Gas Emission Inventory of Pakistan for the Year 2014-15 at FAO Office Islamabad on 12 April 2017;

xxix. Amjad Masood - Seminar on "Managing Indus Basin for Sustainable Development, Food Security and Poverty Alleviation" at UET, Lahore on 13 April 2017;

xxx. Syed Mehmood Nasir, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood - Meeting with LEAD Pakistan team to discuss the USAID-PEER project on the Kabul River Basin at IG (Forests) MoCC on 18 April 2017;

xxxi. Muhammad Arif Goheer - 8th National Farmers Convention at Pakistan Academy for Rural Development Peshawar from 26-28 April 2017;

xxxii. Muhammad Arif Goheer - Executive Development Institute of the National School of Public Policy – Lahore Leadership & Governance in Food Security at Lahore on 08-12 May 2017;

xxxiii. Muhammad Zia-ur-Rahman Hashmi - Climate Vulnerability Assessment and Adaptation of Water Systems at USPCASW, MUET, Jamshoro on 11-12 May 2017;

xxxiv. Shaukat Ali, Nuzba Shaheen & Aftab Ahmad Khan - One-Day Workshop on Hydrologic Modeling Using HEC-HMS at PCRWR on 15 May 2017;

xxxv. Muhammad Zia-ur-Rahman Hashmi - PCRWR – Plenary Workshop on "Inter – Provincial Water" Pakistan's Water Apportionment Accord 1191: 25 Years at Marriot, Islamabad on 17 May 2017.

13. Contributions to Research Projects (3):

i. UNEP Project on Preparation of Intended Nationally Determined Contributions (INDC) to the 2015 Agreement under the United Nations Framework Convention on Climate Change (GFL-5070-2724-4F36-2207);

ii. APN Project on "Runoff Scenarios and Water Based Adaptation Strategies in South Asia" (ARCP2013-20NMY-Shrestha);

iii. Contributing to Pakistan: enabling Activities for the Preparation of Pakistan's Second National Communication (SNC) under United Nations Framework Convention to Climate Change, Project funded by UNEP and Lead by Ministry of Climate Change.

14. Mass Awareness / Media Appearance:

- Muhammad Arif Goheer-GCISC presentation in the Radio Pakistan programmes on the topic of climate change-28 March 2017;
- All GCISC Staff-Tree Plantation Campaign 2017 at Jasmine Garden, Islamabad by MoCC GCISC-9 Feburary 2017;
- International Dialogue "Adaptation to Climate Change- Understanding Future Water Availability" August 1, 2016 Auditorium, CIIT-Wah, Pakistan;
- Muhammad Arif Goheer-Live Radio Programme – Rabta to talk on the issue of climate change on Radio Pakistan-13 April 2016.

15. Contribution to Key International/ National Reports:

- Six GCISC scientists Contributed for different chapters of UNEP GEO-6 Asia-Pacific Region component;

- Two GCISC scientists contributed to 2019 Refinement to 2006 IPCC Guidelines for the preparation of Greenhouse Gas Inventories;
- Coordinated and contributed to to Pakistan-Intended Nationally Determined Contribution (PAK-INDC) study Project exceuted by Ministry of Climate Change through GCISC.

16. Other Important Assignments:

General Administrative/ Technical Functioning:

- Provision of technical advice to Ministry of Climate Change and other Government entities on climate-related issues;
- Submission of responses to Ministry of Climate Change on National Assembly/Senate's Starred / Un-starred Questions and Motions and other queries and concerns raised by Ministry of Climate Change (MoCC) and other institutions;
- Convening of 3rd Meeting of Board of Governors, GCISC on 24 November 2016.

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