YEAR BOOK

2017-18

Government of Pakistan
Ministry of Climate Change
Islamabad

Message from the Minister/ Advisor

Climate Change is affecting almost all the sectors of our economy particularly water resources, energy, health, biodiversity, with a major impact on agricultural productivity. This is due to changes in temperature, its adverse effects on land and water resources and the rise in frequency intensity of natural hazards such as droughts and floods. Ministry of Climate Change has formulated a comprehensive National Climate Change Policy (NCCP) – 2012 and also developed its framework for implementation. It is a fact that Pakistan's contribution to global greenhouse gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, transport, industry, urban planning, agriculture and livestock.

In view of Pakistan's high vulnerability to the adverse impact of climate change, the Ministry has adopted a comprehensive approach on the disaster risk reduction and management. We are working to change the energy mix based on our meager resources to reduce carbon emissions without compromising the development pace.

The Year Book provides 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 the wake of 18th Amendment to the Constitution, new vision has been given by the Parliament in handling federal and provincial responsibilities. The Ministry of Climate Change upholds the constitutional mandate to meet obligations of the government to national and international community regarding climate change issues. The Ministry has the mandate for formulation of national policy, plans, strategies, and programmes with regard to disaster management including environmental protection, prevention of pollution, preservation of ecology, forestry, wildlife, and biodiversity.

The Year Book 2017-18 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 / autonomous bodies.

Any suggestion/observation for further improvement would be appreciated.

(AAMIR ASHRAF KHAWAJA)
Secretary

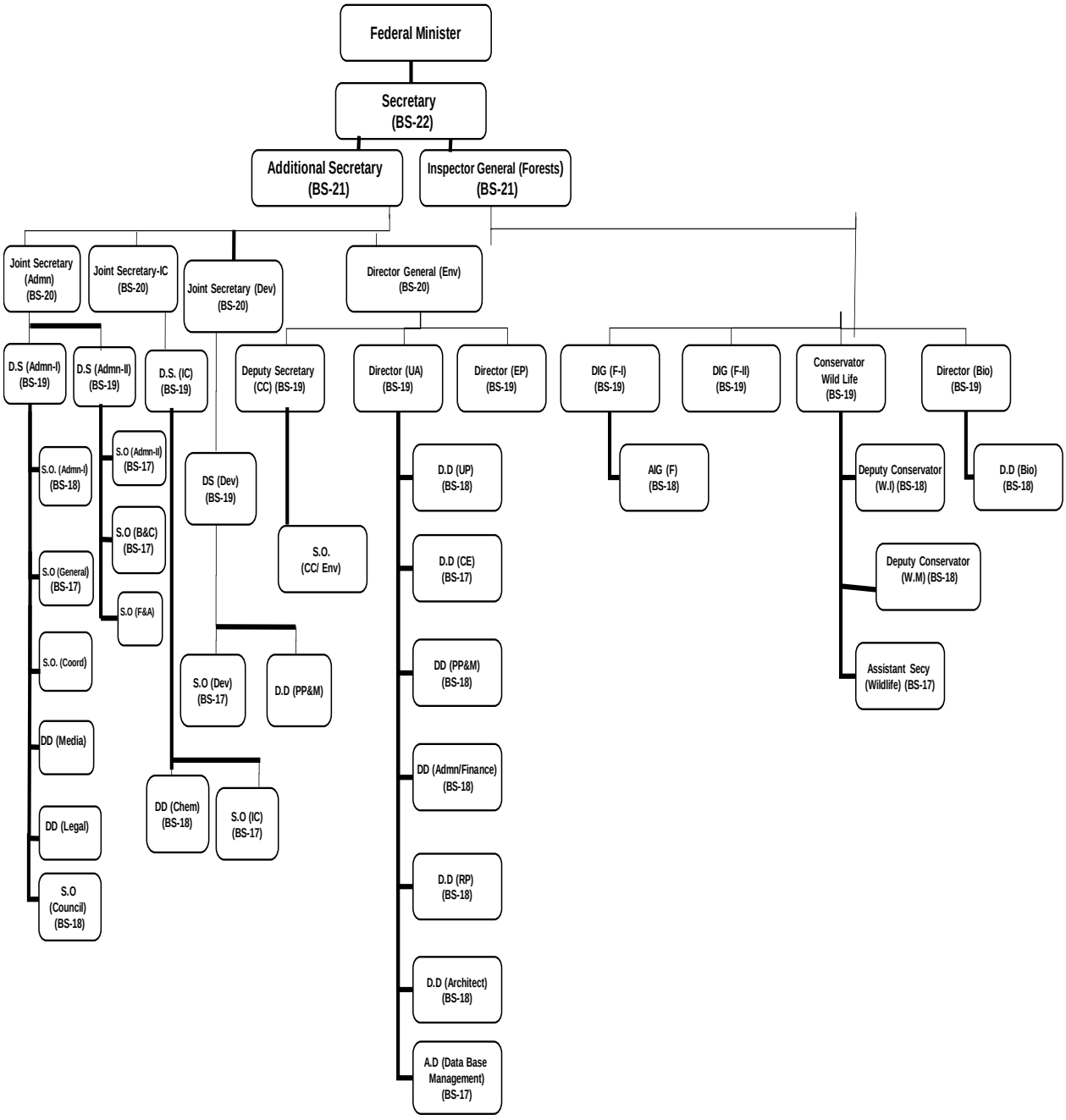
1. ADMINISTRATION WING

Total strength of the Climate Change Division during year 2017-18 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 this Ministry including.
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

Zoological Survey of Pakistan (ZSP) is executing two PSDP Projects.

1. "Strengthening Zoological Survey of Pakistan" for undertaking immediate inventory of endangered wildlife species and habitats across Pakistan for producing regular status reports on periodic basis''.
2. "Construction of Boundary Wall of Zoo-Cum Botanical Garden Islamabad"

1. STRENGTHENING ZOOLOGICAL SURVEY OF PAKISTAN

The project was approved on 17th January, 2017 and started from 1st July, 2017 and will end on 30th June 2020. The total cost of the project is Rs: 87.726 million.

Objectives

- Explore and identify mammals & birds in relation to their habitats
- Collect information regarding the population status, abundance and distribution of important wild animals & birds

- Identify threats affecting their density and distribution in their habitats
- Develop a database in order to improve management decisions for mammals conservation
- Public awareness particularly in local communities living in close vicinity of wild species
- Rising awareness through workshops, posters etc.
- Develop field guide and compile the data in the form of book (s) & publish technical reports

Benefits of project

- Associated policy and institutional strengthening
- Better coordination and liaison with provincial wildlife and forest departments
- Enhancing cooperation with life sciences departments of the universities through Higher Education Commission for engaging research scholars
- Better understanding of all the biodiversity and effective means for ensuring their sustainable use
- Developing community based biodiversity management initiatives
- Developing and institutionalizing systems to monitor key elements of biodiversity

Achievements of the project during FY 2017-18

Workshops:

i. Inception workshop was organized and all the stakeholders were invited to participate.
ii. Meeting with stakeholders to discuss progress of project was held.
iii. Training session on Field Research and Data Collection held with Quaid-e-Azam University Islamabad.

Field Surveys:

Following field surveys have been carried out and reports have been communicated to MoCC

i. Field Survey for Punjab Urial at Lehri Nature Park
ii. Exploratory Survey of Deosai National Park with Specific Reference to Endangered Fauna
iii. Baseline Survey of Machiara National Park, AJK
iv. Baseline Survey of LalSuhanra National Park

v. Field Survey for Punjab Urial at ChumbiSurla and Jalalpur Wildlife Sanctuaries
vi. Field Survey for Vultures at District Kotli and Mirpur(AJK)

Database Development:

i. Website of Zoological Survey of Pakistan prepared and uploaded
ii. Species data records for database development under process

2. CONSTRUCTION OF BOUNDARY WALL OF ZOO-CUM BOTANICAL GARDEN ISLAMABAD

- Botanical Garden was incorporated in the Master Plan of Islamabad in 1968
- In 1989 physical possession of land was given by CDA to Zoological Survey of Pakistan
- In 2003 Zoological Survey of Pakistan started demarcation of land
- In 2004 Survey of Pakistan completed demarcation of the land by erecting 160 boundary pillars.

In order to protect and develop the state land on the special directives of Prime Minister of Pakistan the project was included in Green Pakistan Programme and was approved on March 2017. The project started from 1st July, 2017 and will be completed on 30th June 2019. The total cost of the project is Rs: 103.494 million.

Objectives

- To insure protection of state land from encroachers & land grabbers by construction of boundary wall of Zoo-cum Botanical Garden.
- To promote ex-situ conservation of biological diversity through such ecologically targeted initiatives.

Benefits of project

- Protecting of state land from land grabbers encroachers
- Internal development
- From development of botanical garden employment opportunities will be generated

Achievements of the project during FY 2017-18

The work of construction was started in December 2017 and was formally inaugurated by Honorable Minister for Climate Change.

On the directives of Chief Justice of Pakistan all the land earmarked for Zoo-Cum botanical Garden was retrieved from land grabbers with assistance of administration of Islamabad Capital Territory.

In the FY 2017-18, out of 14 km area, 5 km area cleared and excavated to fence the Boundary wall thus boundary pillars have been erected at 4 km area and fencing will be completed before 30th June 2019.

3. 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 hectarein 14 districts covering more than 200 villages. The integrated activities will be performed in Agriculture, Forest, irrigation, livestock, rangelands and soil conservation/stabilization sectors.

Project Districts:

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

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)

Total PC-I Allocation	Allocation (2017-18)	Surrender (2017-18)	Expenditure (2017-18)
105.43	25.000	7.25	17.334

Allocation and Expenditure FY- 2017-18 **(Rs. In Millions)**

4. Establishment of Geomatic Centre for Climate Change and Sustainable Development 2013-2016.

Sectoral Overview:

Climate change is a geographic problem, and we believe solving it takes a geographic solution. Reducing the risks caused by climate change is an immense challenge. Now a days. 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.

Geomatic Center for Climate Change and Sustainable Development project in Pakistan Environmental Protection Agency Islamabad is one of venture under Ministry 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.

Objectives of the project are as follows:

- 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.

1.	**Approved Cost**	48.885 (Local)	
2.	**Revised Cost:**	Nil	
3.	**Allocation 2017-18**	Allocation (Local)	Expenditure
		33,828,000	17,864,187

Allocation for the year 2017-18 (very brief)

Major activities performed during 2017-2018:

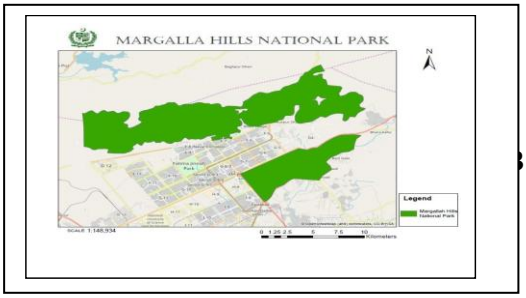
What was done?

i. Establishment of well-resourced center of geo spatial technology

A Well-equipped Centre of geospatial technologies for environmental monitoring in Pakistan is established in Geomatic center for climate Change. The Geomatic Centre for Climate Change and Sustainable Development is a project started by the Ministry of Climate Change in Pakistan Environmental Protection Agency. The project, with latest techniques and evaluation methods boosts application of Satellite Remote Sensing (SRS), Geographical Information System (GIS) and Geographical Positioning System (GPS) technologies in environmental monitoring and decision making.

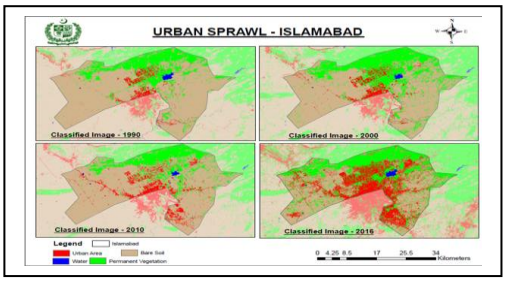
ii. **Digital Environmental Atlas of Islamabad**

The Digital Environmental Atlas of Islamabad was launched under this project. 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 networketc.



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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. NASA's Orbiting Carbon Observatory-2 for the year 2015-2016 was used for monitoring air pollution.

iii. Industrial Area Survey for Air Quality 2017-18

Islamabad, Federal Capital of Pakistan, is located at the foot of the Margalla Hills. During summer, polluted air masses are adverted predominantly into Islamabad from Industrial Estate and Rawalpindi (in the southeast). The major concern of Islamabad city is the Industrial estate

that includes sector I-9 and I-10. Industrial estate Islamabad is spread over 625 acres of land on the border of cities of Rawalpindi and Islamabad. There are 487 total plots and 260 industrial units in sector I-9. On the other sector I-10 has total plots 269 and 215 total industrial units. Ambient air over the industrial estate Islamabad is overburdened due to air pollution which is a major threat to the residents of industrial estate. Vehicular emission, energy production, and industrial processes are other major sources of air pollution. In this concern Geomatic project is conducting an Industrial Area Survey which includes I-9, I-10 and Kahuta triangle. The main aim of carrying out environmental survey in the Industrial Estates Islamabad (IEI) was to highlight the environmental issues that are typical of an industrial estate in Pakistan.

The objectives of the survey includes:

1. Quantification of particulate matters ($PM_{2.5}$ & PM_{10}) gases in industrial and residential area of Islamabad.
2. Recommending technology solutions for industry to abate pollution;
3. Providing guidelines for improving the environmental status of the industrial estate; and
4. Initiating a discussion for developing consensus on the recommendations to improve the environmental status of the industrial estate.

iv. Achievements of Management Information System (MIS)

- Establishment of Server room and deployment of Local Area Networking (LAN)
- Revamping of Pak-EPA website through NITB, MoIT, & Telecom
- Deployment of new Hi-tech server for Geomatic Center (Central Environmental Application)

New Initiatives:

Geomatic Center has taken the initiative of Glacier monitoring of Pakistan using GIS and Remote sensing technologies. In this concern, two glaciers i.e. Baltoro and Siachen were chosen for monitoring purpose. Detailed analysis including stream network analysis, terrain analysis and change detection was carried out for the years 1978 to 2018 using satellite imagery.Its technical report will be published in the succeeding months.

Moreover, publication of State of Environment Report (2016), automation of the EIA/IEE data for Pak-EPA and development of the Web-based application/database for GIS based (environmental) data on various environmental issues for planners and researchers etc. will be taken up.

v. GREEN PAKISTAN PROJECT

The main objective of the program 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.The programme towards reviving forestry resources in the country is being implemented through PC-I scheme titled,Green Pakistan Programme (2016-2021). The estimated cost of the project is Rs. 4.717 billion for a period of five years.A total of one hundred million new indigenous plants are to be planted over the next five years in different ecological zones. The activities are being undertaken in 100 districts spread all over Pakistan.

The latest progress till date is as under:

Total plants planted, sown and regenerated in plantations and enclosuresis33.065million plants and total planting stock established in nurseriesis22.005million.

i. Intensive planting of suitable species on 22 ha of degraded slopes in Giglit-Baltistan (66,655 plants)
ii. 30.35 ha land treated with a combination of different bio-engineering structures consisting of layering, vegetated soft gabions, live brushwood check dams etc. in AJK;
iii. 2803 cubic meter of bio-engineering structures constructed in Rawalpindi North Forest Circle in Punjab;
iv. 3,913 cubic meter of loose stone check dams constructed with 566 cubic meters in Juniper and Chilghoza forests of Baluchistan and 3,347 cubic meters in Scrub Forests of FATA.
v. 991 cubic meter of Gabion structures constructed in Chilghoza Forests of Baluchistan;
vi. 61 meter of gabion flood protection spurs constructed in GilgitBaltistan;
vii. 254 meter of diversion channels constructed to divert water from streams to marginal waste lands for afforestation in GilgitBaltistan;
viii. 72 water harvesting ponds constructed with 104140 plants planted in the immediate catchments of these ponds in Rawalpindi North and Rawalpindi South Forest Circles in Punjab.

Benefits of Project: The project will be beneficial at national, provincial and territorial level. Provision of direct and indirect employment opportunities in the country will help in poverty alleviation. The local communities will also generate their income through eco-tourism on sustainable basis.

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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 2017-18 are as follows:-

A. Implementation Of The ODS Phase Out Projects:

- **i.** Organized Roundtable meeting with Industry, HVACR Society and ASHRAE on 25 October, 2017 at Lahore.
- **ii.** To discuss the Kigali Amendment and its impact on Pakistan, NOU and MoCC organized a workshop on "Kigali Amendment - The Way Forward" on 25 October, 2017 at Islamabad.
- **iii.** Assessed the HCFC importers warehousing facility and directed them to maintain their warehouses meant for HCFC storage as per the MSDS.
- **iv.** Developed training module for training of Refrigeration and air conditioner technicians in collaboration with NAVTTC. The module was also translated in National language.
- **v.** Issued and monitored HCFCs import quota for the year 2017.
- **vi.** Collected and analyzed monthly HCFCs and Methyl Bromide import data for 2017. This enabled NOU to effectively implement and manage import system.
- **vii.** HCFC Quota was issued to the eligible importers of HCFCs on 16th February, 2018 by taking all the stakeholders on board.
- **viii.** For smooth implementation of the HCFC phase out programme the industrial/ commercial importers data for HCFCs import was monitored on monthly basis in 2018. National Ozone Unit updated the HCFCs importers regarding latest requirements of the ODSs storage and maintenance. In this context, NOU carried out periodic field visit to HCFCs importers warehouses.
- **ix.** NOU participated in PHVACR Expo 2018, and exhibited NOU's awareness material stall. The expo was organized at Islamabad from 5-7 April, 2018. The NOU stall was visited by more than 200 participants.
- **x.** NOU arranged one technical session on 6th April, 2018 in parallel to PHVACR wherein two international experts from P.R. China were mobilized with the support of UNEP, Bangkok. The technical session focused on the emerging technologies in RAC sector.

B. Enforcement of Policy / Regulatory Measures:

a) 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 2017.
b) Trained Masters for refrigeration and air conditioning technicians as well as for Customs officer. For these trainings, International trainers/experts were invited. The trained master trainers will act as local multiplier and will impart training to local technicians and Customs officers.
c) In case of refrigeration technicians, NOU in collaboration with NAVTTC trained 623 technicians by Master trainers.
d) National Ozone Unit developed module for training of refrigeration and air conditioning technicians. The module focused on HCFC best servicing practices and it also covers the safety aspects of natural refrigerants.
e) Collected, analyzed and submitted data for Article 7 report and country programme reports for 2017 and 2018 to ensure compliance status of Pakistan.

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 PCBs and 1200MT of POPS pesticides.

The activities of Persistent Organic Pollutants (POPs) project for the year 2017-2018 are as follows:

1. Development and implementation of a regulatory, policy and enforcement system to reduce POPs releases and to regulate POPs waste disposal;
2. Capacity building to reduce exposure to and releases of POPs;
3. Collection, transport and disposal of 300MT of PCB and 1200MT of POPS Pesticides;

The main achievements during 2017-2018

- GAP analysis of existing legislation was developed and national consultative workshop for all stakeholders was organized in December 2018 in all stakeholders mutually agreed

to go for amendments in existing legislation instead of standalone legislation. **Draft rules** to include POPs into section 31 of PEPA act have been drafted and shared with stakeholders for inputs.

- 10 number of different national and provincial level training sessions for custom officers on management of POPs (dirty dozen & new POPs) and for energy sector on PCBs management were conducted in November 2018 for all relevant provincial and federal departments. Details of these trainings are;

Workshop	Date	Venue	Male	Female
POPs management or use of POPs free alternatives	20th April 2018	KPK	40	17
	21st April 2018	KPK	40	13
	19th March 2018	GilgitBaltistan	41	10
	20th March 2018	GilgitBaltistan	55	9
Total			**176**	**49**

- To strengthen the capacity of EPA laboratories, project procured and installed Gas Chromatograph – Mass Spectrometer (GC-MS) in Federal EPA, Punjab and Sindh EPA which will be used for sampling and testing of all kinds of POPs. Along with GCMS Installation, staff members of concern EPA were also trained on how to handle the equipment and to perform testing of POPs.
- Short documentaries along with brochures and flyers were also developed and shared with all stakeholders and general public to disseminate Information on POPs.
- Project is working 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. Four laboratories have been engaged for testing and analysis of 2000 PCBs samples.
- Project has completed reconfirmation of POPs Pesticides from all provinces. Draft reports were shared with all concerned departments to cross check the inventories and number of stockpiles. Final reports were released and shared with all relevant stakeholders. Same figures for POPs Pesticides has been validated & reported by National & International team of consultants in parallel under another project of Ministry of Climate Change and UNEP titled "Review and Update of the National Implementation Plan of Stockholm Convention on Persistent Organic Pollutants". The remaining POPs pesticides stockpiles left in country are 286 MT as confirmed during these reconfirmation activities.
- Project also did some research on **remediation of POPs** (including contaminated soil) through advanced technologies and assessment of persistent organic pollutants for human health exposure. Both the reports have been shared with all stakeholders.

3. Chemical Section:

Activities of the chemical section for the year 2017-18 are as follow;

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

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

iii. Awareness Workshops on Minamata Initial Assessment & Training on Inventory of Mercury and Mercury Compounds/In-Products in Pakistan (Karachi, Lahore, Quetta, Muzaffarabad, Peshawar & Gilgit.

iv. Two Meetings of National Coordination Committee on 09thJune, 2017 and 06th September 2018, Islamabad.

v. Two meetings of Sub–committee on 21st June 2018 and 30th August 2018.

vi. Conducted two programmes on Radio Pakistan for awareness on Minamata Convention on mercury

vii. Visited Artisanal and small- scale gold mining (ASGM) sites at Gilgit-Baltistan and met with ASGM workers to know about the ASGM process and their health issues.

viii. Twenty five (25) water samples and twenty five (25) sediment samples collected from Danyor, Old China Bridge-Gilgit River and Opposite to Normal Village, Adjacent to KKH- Hunza River, GB for the analysis of mercury contamination level. Results of these samples have been received from Pakistan Institute of Science and Technology (PINSTECH Laboratory) Islamabad.

ix. Collected researches from identified research institutes and relevant academic departments at Pakistani universities.

x. TORs developed, approved and processed for the recruitment of following;

- Six (06) data inventory assistants.
- Two research assistants.
- One consultant to assess legal and regulatory framework.
- One consultant on compendium preparation on the researches/studies collected from academia and research institutes.

xi. Defended the cases regarding the import of tyres waste for cement industry and pyrolysis plants under Basel Convention in Sind High Court, Karachi.

xii. Initiated the process to resolve the issues of Polymer Importers & Recyclers Association regarding the import of plastic scrap under Basel Convention.

4. IC Section:

i. The IC section worked to develop and sign the Memorandum of Understanding (MoU) between the Republic of Turkey and the Government of Pakistan on the Cooperation in the field of Environment on 23rd February, 2017.

ii. A Memorandum of Understanding (MoU) between the Republic of Turkey and the Government of Pakistan was signed on the Cooperation in the field of Forestry on 23rd February, 2017.

iii. A Memorandum of Understanding (MoU) on Cooperation in the Fields of Climate Change and Environmental Protection was signed between Ministry of Environment and Energy of the Republic of Maldives and Ministry of Climate Change of the Islamic Republic of Pakistan.

iv. IC section extended coordination to hold meetings of Joint Economic Commissions with various countries and furnished comprehensive proposals for enhancing cooperation in the field of Environment and climate change related issues.

v. IC section furnished its views/comments as well as identified areas of cooperation to the Ministry of Foreign Affairs for various high level dialogues.

vi. In regard with the Generalized System of Preferences (GSP) Plus status of European Union, the IC section submitted compliance reports on Conventions/Protocols related to the Ministry of climate change to Ministry of Commerce as and when required.

vii. Several meetings of Treaty Implementation Cell (TIC) were attended by IC section.

viii. Material for Finance Minister's Budget Speech was prepared and submitted.

ix. IC section coordinated for meetings of Joint Ministerial Commissions (JMCs) in collaboration with EAD and provided input.

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4. ENVIRONMENT WING

Government of Pakistan has taken number of steps to mitigate and adapt to the impacts of Climate Change in the country. These steps include measures in country and engagement with International process. Some of the major initiatives include:-

NATIONAL CLIMATE CHANGE POLICY IMPLEMENTATION COMMITTEE (NCCPIC)

The Governments of Punjab, Sindh, AJK and Gilgit- Baltistan have notified Provincial Climate Change Implementation Committees for effective implementation of National Climate Change Policy and Framework for Implementation of National Climate Change Policy (2014-2030)

SIGNING AND RATIFICATION OF PARIS AGREEMENT & DOHA AMENDMENT

Ministry of Climate Change has completed the process of signing and ratification of Paris Agreement and Doha Amendment to the Kyoto Protocol.

SECOND NATIONAL COMMUNICATION (SNC)

Preparation of Pakistan's Second National Communication (SNC) is a three year study leading to stocktaking of all GHG emissions in Pakistan with options of mitigation and adaptation actions, policy measures etc. The National Steering Committee and Thematic Working Groups (TWGs) have already been constituted in 2016 and preparation of SNC is underway.

TECHNOLOGY NEEDS ASSESSMENT (TNA)

TNA is a systematic approach for conducting technology needs assessments in order to identify, evaluate and prioritize technological means for both mitigation and adaptation. It also provides processes and methodologies for uncovering gaps in enabling frameworks and capacities and for formulating a national action plan to overcome them, as part of overall climate change strategies and plans such as NAMAs and NAPs. 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 best practices.

PREPARATION OF NATIONAL ADAPTATION PLAN (NAP)

Pakistan's first National Adaptation Plan shall be developed. The work on NAP is expected to be started after confirmation of international funding. The Adaptation Plan will detail out and help develop actions in the Framework for implementation of NCCP into bankable projects/programmes for Green Climate Fund (GCF) and other funding windows for adaptation.

SACOSAN-7:

South Asian Conference on Sanitation (SACOSAN) a government led biennial conference held on a rotational basis in South Asian Country provides a platform for interaction on sanitation. The participants countries from South Asia are Afghanistan, Bangladesh, Bhutan, India , Maldives, Nepal, Pakistan and Sri Lanka.

Ministry of Climate Change, Government of Pakistan has hosted 7th South Asian Conference on Sanction (SACOSAN-VII) 10-13 April 2018, Serena Hotel Islamabad. The conference has been attended by 800 (Approx) delegates including Ministers and Officials from South Asian Countries, International Experts, officials from federal and provincial governments, representatives of UN agencies and international organizations. The technical discussions and consultation was concluded by agreeing to ten SACOSAN commitments by member countries. The outcome of the conference is:-

i) Establish baselines and WASH targets for SDG-6.1 and 6.2 including the elimination of open defecation and progress towards universal basic and safely managed sanitation services and hygiene. All countries in the region should review and align their national and sub national policies/ strategies with safely managed sanitation services and hygiene as outlined in SDGs.
ii) Streamline and align the data collection tools; processes and approaches of key national and sub national surveys so that they track progress on WASH related SDGs.
iii) To ensure no one is left behind by: generating evidence to understand inequalities in access to WASH especially around geographical areas, vulnerable groups and income levels, improved targ3t5ing of those least served; strengthening partici9paiton and accountability in collaboration with sector partners.
iv) Conduct str4ucted human resource capacity assessment followed by a roadmap for human resource development for public sector, civil society, service providers and other stakeholders engaged in WASH.
v) Introduce essential sectorial reforms based on comprehensive legislative reviews with a specific focus on regulatory frameworks and institutional arrangements including enhanced inter-ministerial coordination for quality sanction and hygiene services.
vi) Develop effective finical planning and reporting on sanitation an hygiene related investments to achieve SDG related targets by strengthening the tracking and monitoring processes.
vii) Develop national and sub national advocacy plans, strategies and campaigns that promote use and sustainability of sanitation services as social norms with the active engagements of all.
viii) Prioritize WASH in institutional settings especially accessible WASH in schools, health care facilities and public places including sensitization and provision of menstrual hygiene management.
ix) Collaborate to strengthen knowledge management and learning on sanction and hygiene at regional national and sub national levels through training centers and networks.
x) Support climate change adaptation and explore financing to promote climate resilient sanitation and hygiene technologies in and behaviors in general and in at risk communities in particular.

THE STATE OF PAKISTAN CITIES (SPC) REPORT

The State of Pakistani Cities (SPC) report is a pivotal document which identifies the underlying socio- economic drivers contributing to the state of urbanization in the ten largest cities namely Karachi, Lahore, Faisalabad, Rawalpindi, Gujranwala, Peshawar, Multan, Hyderabad, Islamabad and Quetta and their efficacy to respond to the urbanization challenges. The findings of the study reveal that the en selected cities make up more than half of the total urban population, according for 54 percent of te national urban population.

Pakistani cities vary considerably in terms of their size of economy. Employment and tax revenues Services and industry are the major employment sectors in Pakistani cities. The share of the service economy in the cities is larger than the share of services in the national economy. The economies of Provincial headquarters and the federal capacitor are more service oriented than other cities with the rising share of services, direct tax collection has increased, primarily because of the withholding tax regime Pakistan generates 95 percent of its total federal tax revenue from its ten major cities and Karachi contributes 55 percent, Islamabad 16 percent and Lahore 15 percent. Much of the tax revenue is associated with large services such as telecommunication, finance and insurance, transport and manufacturing industry as well as higher per capita income in cities as compared to the rural areas.

Poverty in urban areas is a major and visible phenomenon. Six out of the top ten major cities have double-digit poverty figures: Quetta, with 46 percent has the highest poverty rate while Multan has 35 percent, Peshawar 31 percent, Islamabad with 3 percent has the lowest poverty rate. The urban management functions of Pakistani cities are dispersed among several institutions, mostly semi-autonomous bodies, functioning under provincial government departments. The main urban management/administrative bodies responsible for different aspects of city management are municipalities, district administration, development authorities and service delivery institutions etc. The responsibility for urban planning in Pakistani cities rests with city development authorities.

Urban planning and management remains limited due to the lack of relevant information and statistical urban data. Furthermore, city planning cycles do not take census dates into account and consequently the base data used for urban planning have to be projected or extrapolated making comparisons or measuring progress difficult. Provision of unban services it the responsibility of government institutions. The major cities have large and increasing numbers of informal settlements, which do not have access to adequate levels of basic services. Despite the introduction of metro buses and the construction of signal-free corridors and other such measures, urban transportation remains a consistent challenge for Pakistani cities. Karachi has a complex traffic network with a large number of private vehicles contributing to major traffic congestions. In Lahore the number of registered vehicles has more than doubled in the last decade. However, Lahore constructed numerous underpasses to ease congestion and prevent the traffic congestions and established a successful Metro Bus System.

The general understanding and appreciation of the environment and heritage is low and narrowly defined public space in Pakistani cities has been continuously shrinking due to the high commercial value of urban space and urban land. Public space such as green space, roads, streets, intersections transport rights-of-way and other corridors provided for but not exclusively expropriated. Pakistani cities are not inclusive and certain groups are deliberately and specifically (explicitly or implicitly) excluded from various aspects of city life, provision and access. The exclusion, of the poor but market forces is perhaps the most visible in terms of housing, land and services provision, while that of women, religious and ethnic minorities and

of the physically challenged by social forces is less visible precisely because they are rendered invisible by the working of social mores and bias. The lack of acceptance of the rights and needs of large sections of the community not only acts as deterrence and an injustice but also deprives cities of the participation an contribution of large sections of the population. Often forced into segregated open secluded existence, these citizens also becomes easier to target and further isolate and exclude.

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5. FORESTRY WING

STATUS OF FORESTS

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, fuel wood, forest lands, and other forest products. Annual consumption of wood (timber and fuel wood) 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 18th amendment in the Constitution and abolition of concurrent list, Federal PSDP grants to provinces for afforestation projects were stopped. Presently, significant programmed 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 18th amendment, the functions of Forestry Wing according to the revised Rules of Business are as under:

1. National Policy, plans strategies and programs 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
- Technical assistance / training & capacity building of provinces
- 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:

Conventions/Protocols dealt by Forestry Wing

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

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+Programmed
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 programmed 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 Programmed 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 2017-18 inter-provincial meetings on the onset of Monsoon 2017 and Spring 2018 were held whereby achievement against target fixed for tree planting are as follows:

(*Plants in Millions*)

Season	Target	Achievement	Survival Rate
Monsoon 2017	107	107.3	75%
Spring 2018	102.35	84.1	80%

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 four aforementioned elements required to complete the REDD+ readiness phase.

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 Strategy and Action Plan (NBSAP) has been approved and submitted to Secretariat of Convention on Biological 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 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 2017-18 by different directorates of Pak-EPA.

1. Directorate of Lab/NEQS

- Monitoring activities conducted by lab section during period 2017-18 are as under:
  - Monitoring of G-9, Islamabad against the complaint of untreated waste water being discharged into natural streams.
  - Surprise monitoring of industrial estate, I-9 & I-10, Islamabad to check the status of smoke emissions.
  - Monitoring of High Rise project site located in Zone-V, Islamabad to grant environmental approval.
  - Monitoring of industrial zone I-9 & I-10 to check the status of air quality.
- Water sampling of upstream and downstream water channels and wet markets in Islamabad and its analysis for tricyclic (Antimicrobial Resistance Surveillance) AMR project of WHO.
- Water sample collection from filtration plants installed by CDA in Islamabad and analysis of their water quality.
- Collection of water samples from different sites for the examination of fish casualties in Rawal Dam during 2017-18. Samples were analyzed by joint team formulated by Pak-EPA and it was found that most of the physio-chemical parameters and trace metals were within the safe limit whereas samples collected from the entry points of different streams entering into the lake were contaminated.
- Joint research venture with Islamic International university students for evaluating the impact of Nullah Lai contamination on drinking water quality.
- Sampling and analysis of water quality of reservoirs (Rawal dam, Simly Dam), the core source of water supply to twin city (Islamabad and Rawalpindi).
- Detection of Particulate Matter (PM) in ambient air using High Volume Air Sampler.

- Detection of Arsenic from boring water in different zones of Islamabad.
- Regular monitoring of Air Quality of Islamabad by using Automatic Air Quality Fixed Station.
- Research supervision and facilitation of M.Phil & Ph.D research students in the field of environmental science of various universities (Bahria, Islamic International, Fatima Jinnah, NUST, Faisalabad Agriculture) specifically for waste water and industrial effluent analysis in industrial area Islamabad.
- Research supervision and facilitation of BS students of Islamic International University and Fatima Jinnah Women University in Pak-EPA lab for study of open dumping of municipal solid waste and its impact on soil and water quality in sector I-12, Islamabad and Physio chemical analysis of waste water treatment plant, Islamabad respectively.

Microbiological Laboratory

Data Surveillance Center

Fixed Air Quality Monitoring Station

Mobile Air Quality Monitoring Station

Air Quality Monitoring Analyzers

2. Directorate of Legal/Enforcement

- During the period 2017-18, 12 Environmental Protection Orders (EPO), 54 legal notices were issued to different violators under section 16 (2) Pakistan Environmental Protection Act, 1997 and personal hearings were conducted in 39 cases.
- 05 Environmental cases filed in the Environmental Protection Tribunal (EPT), Islamabad and 07 violators were penalized through EPT by Pak-EPA equivalent to Rs.3.7 Million.
- Directions issued to PIMS through EPT for installation of incinerator and compliance of Hospital Waste Management Rules, 2005.
- Proceedings/litigation attended on environmental related issues in Supreme Court, high Court Civil Court and Environmental Protection Tribunal.

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

- During the period July 2017 to June, 2018, eleven (11) Initial Environmental Examination (IEE) Reports have been received for review at this Agency, while three (03) reports have been approved, seven (7) reports are under process and one (1) report has been rejected.
- During the same period, six (06) Environmental Impact Assessment (EIA) Reports have been received in this Agency, whereas, one (01) report has been approved and five (05) reports are under Process.

Hospital Waste Management

Under section 31 of the Pakistan Environmental Protection Act 1997 (XXXIV of 1997), Pakistan Environmental Protection Agency notified Hospital Waste Management Rules 2005 under S.R.O. 1013(I)/2005 dated 03rd August 2005. Under these rules, the responsibility of waste management rests with the hospital. For this purpose, a Waste Management Team may be constituted. These rules include formation of a waste management team in hospitals and designation of duties and responsibilities for the members of the Team. The composition of Waste Management Advisory Committee has also been given. These rules cover different aspects of waste management such as, their responsibilities, plan, collection, segregation, transportation, storage, disposal methods.

The activities performed by Pak-EPA regarding Hospital Waste Management are as under:

- Public notices were issue in local newspapers to all health facilities to dispose of their hospital waste in accordance with Hospital Waste Management Rules, 2005 and submit its waste management report on monthly basis to Pak-EPA.
- Letters were issued to health facilities in ICT in August 2016 and October 2017 regarding regular submission of their monthly waste reports and constituting their hospital waste management team.
- Currently 33 out of 93 health facilities are submitting the waste reports on regular basis.
- Monitoring of health facilities in ICT was carried out for the compliance of Hospital Waste Management Rules, 2005.
- Development of an annual hospital waste inventory in which daily waste record from health facilities in ICT is being maintained.

4. National Biosafety Centre

Pakistan is a party to the Cartagena Protocol on Biosafety (CPB) under Convention on Biosafety (CBD) since May 31, 2009. It is obligatory to devise implementation mechanism for regulating Genetically Modified Organisms (GMOs) and their products. Pak-EPA drafted, and the Federal Government notified Pakistan Biosafety Rules vide S.R.O. 336 (1)/2005 on 21st April 2005 to provide legal cover for regulating GMOs. 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. National Biosafety Centre (NBC) under a development project was established at Pak-EPA in April 2006 for a period of 5 years. The center provides implementation setup for Biosafety rules to regulate the activities related to import, use and propagate the GMOs and their products. The regulatory activities are necessary to offset impacts of modern biotechnology on food, health, environment, socio-economic progress of the country.

Approval process for the Genetically Modified Organisms (GMOs) involves three tiers of forum i.e.

1. Institutional Biosafety Committee (IBC), Chaired by Head of Institution.
2. Technical Advisory Committee (TAC), Chaired by DG Pak-EPA.
3. National Biosafety Committee (NBC), Chaired by Secretary MoCC.

All cases of GMOs either for laboratory manipulation work, field trials, import or commercial release required approval from all three committees. The activities under NBC done by Pak-EPA during period 2017-18 are as under:

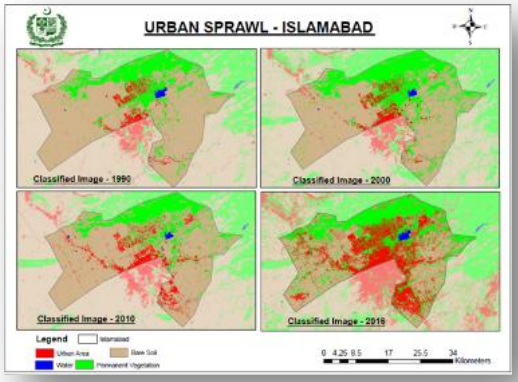
- Total 23 meetings of Technical Advisory Committee (TAC) and seventeen (18) meetings of National Biosafety Committee (NBC) has been conducted so far. The 1st, 2nd and 3rd National Reports to the Cartagena Protocol have been submitted to the Secretariat.
- Since June 2017, a total of eighty (80) cases of Genetically Modified Organisms (GMOs) related activities have dealt so far. Among these twenty-six (26) cases are of laboratory genetic manipulation work, eleven (11) cases of import & transport, forty-two (42) cases of field trials and one (01) case of commercialization were considered.

Project: Establishment of Geomatic Centre for Climate Change and Sustainable Development

Geomatic Center for Climate Change and Sustainable Development project in Pakistan Environmental Protection Agency Islamabad is one of venture 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. Major activities performed by Geomatic Center during 2017-18 are as under:

- A Well-equipped Centre of geospatial technologies for environmental monitoring in Pakistan was established in Geomatic center for climate Change.
- Digital Environmental Atlas of Islamabad:

The Digital Environmental Atlas of Islamabad was launched under this project. It assembles seamless, accurate cartographic data including maps and documentation regarding Islamabad's natural resource profile in the context of its land and environment. 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. NASA's Orbiting Carbon Observatory-2 for the year 2015-2016



was used for monitoring air pollution.

- Industrial Area Survey for Air Quality 2017-18
  Geomatic project conducted an Industrial Area Survey which includes I-9, I-10 and Kahuta triangle. The main aim of carrying out environmental survey in the Industrial Estates Islamabad (IEI) was to highlight the environmental issues that are typical of an industrial estate in Pakistan. The objectives of the survey includes:
  - Quantification of particulate matters ($PM_{2.5}$ & PM_{10}) gases in industrial and residential area of Islamabad.
  - Recommending technology solutions for industry to abate pollution;
  - Providing guidelines for improving the environmental status of the industrial estate; and
  - Initiating a discussion for developing consensus on the recommendations to improve the environmental status of the industrial estate.

- Establishment of Server room and deployment of Local Area Networking (LAN)
- Revamping of Pak-EPA website through NITB, MoIT, & Telecom
- Deployment of new Hi-tech server for Geomatic Center (Central Environmental Application)
- Glacier monitoring of Pakistan using GIS and Remote sensing technologies. In this concern, two glaciers i.e. Baltoro and Siachen were chosen for monitoring purpose.
- One Day Seminar on Role of Geographical Information Systems (GIS) in Monitoring CO_2 Emissionson23rd January, 2018 in Serena Hotel, Islamabad was organized by Geomatic Center.

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ii.Zoological Survey of Pakistan (ZSP)

Zoological Survey of Pakistan (ZSP) is one of the key Federal Agencies involved in policy making for wildlife conservation in the country. ZSP is mandated to monitor the current status and distribution of wildlife of wildlife of Pakistan. Besides these objectives, ZSP is also mandated to maintain standard zoological collections for reference from different parts of the country impart education and raise awareness among the masses for biodiversity conservation. Currently ZSP is executing two PSDP Projects.

The objectives of the department are,

- 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 2017-2018 Zoological Survey of Pakistan Carried out following activities.

1. **Survey and research activities:**
   i. **Survey of Wintering Water Birds at Rawal Lake** wetland with the following objectives;
      To Study the migratory waterfowl diversity and abundance
      To investigate threats to avifauna of Rawal Lake
      To prepare an inventory of birds of the area.

   During the current year surveys of Rawal lake wetland were under taken and a number of migratory bird species were recorded. Migratory Birds diversity with Population estimation report has been submitted.

   ii. **Mid- Winter Waterfowl Census** is a regular activity of Zoological Survey of Pakistan. It is conducted with the following objectives;
      To study the population dynamics of migratory and local water birds on important wetlands and Ramsar sites.
      To study the trends in population of migratory water birds.
      Recommendations for management of species and their habitat.

   Important wetlands and Ramsar Sites in Punjab and Sindh were studied for mid-winter waterfowl census 2017-2018.

   Wetlands of Punjab

   During the current waterfowl census (2018) a total of 57 species of water birds (both migratory and resident) (59,462 birds) were documented at the significant surveyed wetlands of Punjab . The largest population (24166) of migratory water birds was observed at ucchali lake while smallest one at Khabbeki Lake with 435 individual birds. Like previous record, Common Coot(*Fulicaatra*) was found most abundant species with highest population at almost all the

wetlands i.e. 16894 individual birds. While, Common Teal (*Anascrecca)* was found second abundant (9989) birds at the wetlands followed by Shovler (*Anasclypeata*) 5728 birds and Common Pochard(*Aythyaferina*) 4038 birds.

If we compare present results with previous years, the number of water birds has decreased at few wetlands especially at Chashma Barrage which counted largest number of birds in comparison to other wetlands of Punjab.

The other factors may be due to shifting of migratory birds to other wetlands of lower parts of country or further on their route to India. It has been also observed that duration of winter season (cold span) has decreased and the water birds start early back migration to colder regions (personal observation). This change in migratory pattern may be due to climate change.

Wetlands of Sindh

During the current waterfowl census (2018), a total of 207437 water birds belonging to 70 various species (both migratory and resident) were observed at the wetlands of Sindh. Nurri Lake had the largest population (**37803**) of migratory water birds, while smaller population was observed at Drigh Lake (1022) birds. It is encouraging to know that population of water birds at Haleji Lake, which was once called the paradise of waterfowl, is replenishing again through the recent years. In current mid waterfowl census, a total of 35490 water birds were recorded at Haleji lake. *Fulica atra* (common coot) was found most abundant species with highest population at almost all the wetlands i.e.**69363,** birds, while, *Anas crecca* (Common Teal or Green-winged Teal) was observed second most abundant water bird at the wetlands of Sindh i.e.61087 birds. If we compare the current data with previous a significant increase has been noted in the number of migratory waterfowl species at all the wetlands of Sindh.

The report has been sent to Punjab Wildlife Department and Sindh Wildlife Department and also to Wetlands International.

iii. Studies on Threatened Species of Wildlife with the following objectives;

To study the distribution and status of concerned species.
To identify the threats to species and its habitat.
Preparation of conservation strategy for species and its habitat
Study of Houbara Bustard (*Chlamydotis undulata*)

During the current year, studies on Houbara bustard have been carried out throughout Punjab along with the team of WWF- Pak, Punjab Wildlife Department and IUCN Pakistan. The report of Houbara bustard has been submitted to Houbara Commission and Punjab wildlife department. The surveys for Houbara bustard population estimation are continued for period of three years.

Survey of Indus Blind Dolphin (*Platanista gangetica minor*),

During the current FY the surveys for population estimates of Indus Blind Dolphin (*Platanista gangetica minor*), was carried out along with the team of WWF-Pakistan, Punjab Wildlife Department and Sindh Wildlife Department. The surveys were started from downstream of Chashma Barrage Punjab to Sukkur Barrage of Sindh.

During 25 days extensive surveys a total number of 16,00 plus Indus Blind Dolphin were recorded from Chashma to Sukkur Barrages. The population Indus Blind Dolphin was observed stable and increasing trend was noted. The report has been submitted to all stake holders for conservation of the species.

2. Publications:

During the current year, following wildlife related material has been published.

a. Wintering Waterfowl Diversity at Rawal Lake, Islamabad. Abstract publication in 38th Congress of Zoology held at Punjab University, Lahore in March 2018
b. Population Abundance, Distribution and Threats to Scaly Anteater (*Manis Crassicaudata*) in Potohar Region of Punjab, Pakistan: Abstract publication in 38th Congress of Zoology held at Punjab University, Lahore in March 2018

Following research articles were published:

a. Wintering Waterfowl Diversity at Rawal Lake, Islamabad
b. Population Abundance, Distribution and Threats to Scaly Anteater (*Manis Crassicaudata*) in Potohar Region of Punjab, Pakistan

During the current FY PSDP Projects being executed by Zoological Survey of Pakistan are as under:

1. Strengthening " Zoological Survey of Pakistan" for undertaking immediate inventory of endangered wildlife species and habitats across Pakistan for producing regular status reports on periodic basis''.
2. "Construction of Boundary Wall of Zoo-Cum Botanical Garden Islamabad"

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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 modeling to predict the impact of projected changes in temperature, precipitation, and water availability, Forestry, 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 policy makers as well as the citizenry.

3. Ongoing Research Activities

I. Climatology & Environment Section

- Assessment of past climate trends over Pakistan and its various sub regions using statistical analysis techniques;
- Development of future climate projections for Pakistan based on:
  i). Post processing and analysis of the outputs of CMIP5 Global Circulation Models (GCMs) from IPCC-AR5
  ii). High resolution climate scenarios by dynamical downscaling the data sets of coarse resolution GCMs using state-of-the-art regional climate models (RCMs)
  iii). Employing statistical downscaling techniques for station based scenarios.
- 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 using latest Intergovernmental Panel on Climate Change (IPCC) guidelines.

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

- Assess 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 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 148 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 2017-18. In case of joint authorship, the name of the GCISC researcher is in **bold** script.

5. Dissemination of R&D findings: Research papers in International / National Journals & Book (21):

i. **Nadia Rehman, Muhammad Adnan and Shaukat Ali** (2018), "Assessment of CMIP5 climate models over South Asia and climate change projections over Pakistan under representative concentration pathways" International Journal of Global Warming (IJGW), 16(4),DOI: 10.1504/IJGW.2018.095994;

ii. Ilmas, B., **Mir, K.A**., & Khalid, S. (2018) Greenhouse gas emissions from the waste sector: a case study of Rawalpindi in Pakistan. *Carbon Management*, 1-10. DOI: https://doi.org/10.1080/17583004.2018.1530025;

iii. **Zafar Q**, Zafar S, Holben B (2018): Seasonal assessment and classification of aerosols transported to Lahore using AERONET and MODIS deep blue retrievals. Int. J. Climatol. 38: 1022–1040;

iv. Khalid, B., Bueh, C., Javeed, **Shaukat Ali**, S., Sultana, Q., & Khalid, A. (2018). The application of a single-model ensemble system to the seasonal prediction of winter temperatures for Islamabad and Lahore using coupled general circulation models. *Weather*, *73*(5), 159-164;

v. Gul, C., Puppala, S. P., Kang, S., Adhikary, B., Zhang, Y., **Shaukat Ali**., Li, Y., and Li, X. (2018). Concentrations and source regions of light-absorbing particles in snow/ice in northern Pakistan and their impact on snow albedo. *Atmospheric Chemistry and Physics*, *18*(7), 4981-5000;

vi. Khan, F., **Shaukat Ali.**, & Pilz, J. (2018). Evaluation of statistical downscaling models using pattern and dependence structure in the monsoon-dominated region of Pakistan. *Weather*, *73*(6), 193-203;

vii. Gong, Z., **Dogar, M. M.**, Qiao, S., Hu, P., & Feng, G. (2018). Assessment and correction of BCC_CSM's performance in capturing leading modes of summer precipitation over North Asia. *International Journal of Climatology*, *38*(5), 2201-2214;

viii. **Amjad Masood**, **Muhammad Zia ur Rahman Hashmi**, **Haris Mushtaq.** (2018). Spatio‐Temporal Analysis of Early Twenty‐First Century Areal Changes in the Kabul River Basin Cryosphere, Earth Systems and Environment(2018) 2:563–571 https://doi.org/10.1007/s41748-018-0066-6;

ix. Khaled S. Balkhair, **Amjad Masood**, Mansour Almazroui, Khalil Ur Rahman, Omar A. Bamaga, Ahmed S. Kamis, Iqbal Ahmed, Mohammed I. Al-Zahrani, K. Hesham, Groundwater share quantification through flood hydrographs simulation using two temporal rainfall distributions, Desalination and Water Treatment 114 (2018)109-119, doi:10.5004/dwt.2018.22346;

x. **M. Adnan, N. Rehman, S. Ali, S. Mehmood, K. A. Mir, A. A. Khan** and B. Khalid, "Prediction of Pakistan Summer Rainfall from Global SST and SLP", Weather, 2017, 72(3), https://doi.org/10.1002/wea.2784;

xi. Muhammad, J., **M. Adnan**, I. Din, **A. A. Khan**, W. Ali and S. Jehan, "Temperature Trend Analysis using Non-linear Regression of Kohat, Northwestern Pakistan", Pakistan Journal of Meteorology, 2017, 14(27);

xii. Khan, F., Pilz, J., &**Shaukat Ali**. (2017). Improved hydrological projections and reservoir management in the Upper Indus Basin under the changing climate. *Water and environment journal*, *31*(2), 235-244;

xiii. 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;

xiv. **Dogar, M. M.**, Kucharski, F., & Azharuddin, S. (2017). Study of the global and regional climatic impacts of ENSO magnitude using SPEEDY AGCM. *Journal of Earth System Science*, *126*(2), 30;

xv. **Dogar, M. M.**, Stenchikov, G., Osipov, S., Wyman, B., & Zhao, M. (2017). Sensitivity of the regional climate in the Middle East and North Africa to volcanic perturbations. *Journal of Geophysical Research: Atmospheres*, *122*(15), 7922-7948;

xvi. Gong, Z., **Dogar, M. M.** A., Qiao, S., Hu, P., & Feng, G. (2017). Limitations of BCC_CSM's ability to predict summer precipitation over East Asia and the Northwestern Pacific. *Atmospheric research*, *193*, 184-191;

xvii. Ramzan M., Ham S., **Amjad M.**, Chang E., Yoshimura K., (2017) "Sensitivity evaluation of convective parameterizations and spectral nudging schemes in historical dynamical downscaling for South Asia" Volume 2017, Article ID 7560818, 20 pages in Advances in Meteorology. (https://doi.org/10.1155/2017/7560818);

xviii. K. Ullah, M. Idrees, Z. Mahmood, T. Iqbal, S. Muhamad. H.Haq, **A.Ahmad**, S.Hussain. 2017. Response of Yield and Related Attributes of Upland Cotton to Weather Variables, American Journal of Plant Sciences, 2017, 8, 1711-1720. http://www.scirp.org/journal/ajps, ISSN Online: 2158-2750, ISSN Print: 2158-2742;

xix. **M**. **Adnan, Rehman, N., Ali, S., Mehmood, S., Mir, K. A., Khan, A. A.** and Khalid, B. (2017). Prediction of summer rainfall in Pakistan from global sea-surface temperature and sea-level pressure. Weather,72:76–84. doi:10.1002/wea.2784;

xx. J. Muhammad, **M. Adnan, A. A. Khan**, W. Ali and S. Jehan. 2017.Temperature Trend Analysis using Non-linear Regression of Kohat, North Western Pakistan". Pakistan Journal of Meteorology. Vol. 14, Issue 27: Jul, 2017;

xxi. M. Abdullah, S. Malik, M. D. Siddiqui and **A. A. Khan.** 2017. Satellite Derived Surface Temperature Fronts in Relation to Tuna Catch in EEZ of Pakistan. Pakistan. Pakistan Journal of Engineering Technology and Science (PJETS), Volume 7(1):19-31.

6. Technical Research Reports (7):

i. Final Report "Runoff Scenario and Water Based Adaptation Strategies in South Asia," *APN E-Lib*, accessed July 18, 2019, http://www.apn-gcr.org/resources/files/original/b5fd5307612c241f327a9c12ce7da648.pdf;

ii. Kaleem Anwar Mir (2018). Air Quality Improvement and Greenhouse Gas Mitigation in Pakistan: An Integrated Approach" by National University of Singapore as a chapter in the book - Sustainability Matters Vol. VI;

iii. Mir, K. a., M. Ijaz, M. A. Goheer and S. Mehmood. 2018. Greenhouse Gas Inventory of Pakistan for the year 2014-15, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;

iv. Enoki, T., Mwakasonda, S., Mir, K.A., Hyde, B., Federici, S., and Chiemchaisri, C. (2017). Report on the individual review of the annual submission of Malta

FCCC/ARR/2016/MLT, *United Nations Office at Geneva*, Geneva, Switzerland. DOI: http://unfccc.int/resource/docs/2017/arr/mlt.pdf;

v. Technical report on the 'Pakistan's Current Mitigation Effort' (2017) submitted to Prime Minister of Pakistan, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;

vi. Mid Term Technical Report of APN-CSA Project (2017) The 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, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;

vii. External Review of various chapters of ICIMPOD Hindukush Himalayan Monitoring and Assessment Programme Report by GCISC's scientists.

7. Scientific Contribution Presentations in International Conferences and Workshops (31):

i. Muhammad Zia-ur-Rahman Hashmi, Inception Workshop of the NSFC-ICIMOD Project "Glacier changes and associated hydrologic impact under warming climate in Hunza Valley along the Sino-Pakistan Economic Corridor", 21-27 June 2018, China;

ii. Kaleem Anwar Mir, participated as a trainee in "2018 UNFCCC-GIR-CASTT Programme on Greenhouse Gases", offered in collaboration by the GIR and UNFCCC, 25 June-19 July 2018, South Korea;

iii. Mubashar Dogar, ICTP Summer School on "Theory Mechanisms and Hierarchical Modelling of Climate Dynamics: Multiple Equilibria in the Climate System, 25 June-05 July 2018, Italy;

iv. Muhammad Adnan, IPCC First Lead Author Meeting for 6th Assessment Report, 25-29 June 2018, China;

v. Muhammad Amjad, IPCC First Lead Author Meeting for 6th Assessment Report, 25-29 June 2018, China;

vi. Shaukat Ali, Abdus Salam International Centre for Theoretical Physics (ICTP), 27 May-04 August 2018, Italy;

vii. Muhammad Adnan, IPCC Expert Meeting on assessing Regional Climate Information, 16-18 May 2018, Italy;

viii. Muhammad Amjad, Intergovernmental Panel on Climate Change (IPCC) Expert Meeting on Assessing Climate Information for Regions (smr H545), 16-18 May 2018, Italy;

ix. Muhammad Amjad, Heinrich Boll Stiftung (HBS) Visiting Program on Energy Transition, 23-27 April 2018, Germany;

x. Muhammad Arif Goheer, Third Lead Author Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories, 10-13 April 2018, Australia;

xi. Muhammad Ijaz, Third Lead Author Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories, 10-13 April 2018, Australia;

xii. Aftab Ahmed Khan, Training on Water & Sedimentation Modeling, 12-16 February 2018, Davis, California, USA;

xiii. Muhammad Zia-ur-Rahman Hashmi, Project results sharing meeting (LEAD-Pakistan's USAID PEER Cycle-04 funded project), 20-24 February 2018, Kazakhstan;
xiv. Muhammad Arif Goheer, Training Workshop On Water & Sedimentation Management, 5-16 February, 2018, Davis, California, USA;
xv. Mubashar Dogar, Volcanic Impacts on Climate and Society (VICS) 2018, 11-16 January 2018, USA;
xvi. Muhammad Amjad, Tailored WRF Regional Climate Modeling for Hydrologic Impact Applications, 22 January-02 February 2018, USA;
xvii. Shahbaz Mehmood, Tailored WRF Regional Climate Modeling for Hydrologic Impact Applications, 22 January-02 February 2018, USA;
xviii. Tariq Banuri, UNFCCC 23rd session of the Conference of Parties (COP 23), 11-17 November 2017, Bonn, Germany;
xix. Shahbaz Mehmood, UNFCCC 23rd session of the Conference of Parties (COP 23), 11-17 November 2017, Germany;
xx. Muhammad Arif Goheer, UNFCCC 23rd session of the Conference of Parties (COP 23), 05-17 November 2017, Bonn, Germany;
xxi. Muhammad Zia-ur-Rahman Hashmi, UNFCCC 23rd session of the Conference of Parties (COP 23), 05-17 November 2017, Bonn, Germany;
xxii. Shaukat Ali, International Workshop on Climate Statistical Downscaling Studies, Integrated Research Program for advancing Climate Models, 02-04 October 2017, Japan;
xxiii. Nuzba Shaheen, International Workshop on Climate Downscaling Studies, Integrated Research Program for advancing Climate Models, 02-06 October 2017, Japan;
xxiv. Muhammad Arif Goheer, Second Lead Author Meeting for the Elaboration of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Inventories, 25-28 September 2017, Zimbabwe;
xxv. Muhammad Ijaz, Second Lead Author Meeting for the Elaboration of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Inventories, 25-28 September 2017, Zimbabwe;
xxvi. Shaukat Ali, PhD research group meeting and CAS-TWAS-WMO event, 18-22 September 2017, China;
xxvii. Muhammad Arif Goheer delivered a presentation on Adaptation and DRR in Agriculture in the context of Pakistan in the Training Workshop on Climate Change and Disaster Risk Management in Agriculture organized by Asian Productivity Organization (APO), 11-15 September 2017, Sri Lanka;
xxviii. Muhammad Arif Goheer moderated a session on Integrating CCA and DRR Measures into National Agricultural Policy, Programs, and Plans in the Training Workshop on Climate Change and Disaster Risk Management in Agriculture organized by Asian Productivity Organization (APO), 11-15 September 2017, Sri Lanka;
xxix. Nuzba Shaheen, 2017 APEC Climate Center Training program on "User-oriented Statistical Downscaling of Climate Information in Agriculture and Water Resources", 16-26 August 2017, South Korea;
xxx. Amjad Masood, Regional Workshop on Himalayan GEOSS, 10-11 August 2017, Nepal;

xxxi. Muhammad Zia-ur-Rahman Hashmi, Knowledge Forum on Indus Basin "The Indus Basin: New Knowledge Frontiers for Development and Resilience", 04-06 July 2017, Sri Lanka.

8. Scientific Contribution Presentations in National Conferences and Workshops (40):

i. Muhammad Arif Goheer delivered a presentation on Pakistan' Nationally Determined Contributions in the Workshop on Climate Resilient Development organized jointly by Ministry of Planning, Development and Reforms and Ministry of Climate Change, 29 June 2018 Islamabad
ii. Muhammad Arif Goheer delivered a presentation on Climate Change Impacts: Adaptation and Mitigation Strategies in International workshop on "Options for an Energy Mix: issue of cost & sustainability by COMSTECH Secretariat- 26-28 Jun 2018;
iii. Muhammad Zia-ur-Rahman Hashmi, delivered a seminar as a guest speaker 'Climate Vulnerability Assessment and Adaptation of Water Systems' held on April 27, 2018 at USPCASW, MUET, Jamshoro;
iv. Tariq Banuri delivered a keynote address on Climate Change at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
v. Muhammad Arif Goheer delivered presentation on Climate Change: Impacts and Adaptation Prospects at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
vi. Muhammad Zia-ur-Rahman Hashmi delivered presentation on Climate Change and its impacts on water resources of Pakistan at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
vii. Shahbaz Mehmood delivered a presentation on Climate Change Projections at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
viii. Muhammad Arif Goheer delivered presentation on Climate Change: Pakistan's Nationally Determined Commitments at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
ix. Tariq Banuri, "Preparing rural communities to cope with climate change through South-South and Triangular Cooperation" by IFAD with GCISC assistance at Serena Hotel Islamabad on 14 Mar 2018;
x. Muhammad Arif Goheer, Session on Climate Change and Food Security, preparing rural communities to cope with climate change through South-South and Triangular Cooperation" by IFAD with GCISC assistance at Serena Hotel Islamabad on 14 Mar 2018;
xi. Shaukat Ali delivered talk on Future Climate Changes over Pakistan using Global & Regional Climate Models as Keynote Speaker in the 1st International Conference on Climate Change impacts on Agriculture and Food supply (IC3AF-2018), Swabi University;
xii. Muhammad Arif Goheer delivered a Keynote presentation on Climate Change and Food security issues in Pakistan in inception workshop under APN Project on Sustainable Watershed Management organized by Pakistan Agricultural Research Council from 27 - 29 December 2017, Islamabad;
xiii. Pakistan Country Report on Improving Skills for Promoting Sustainable Watershed Management Practices in South Asia" December 26 – 28, 2017;

xiv. Muhammad Adnan, Nadia Rehman and Shahbaz Mehmood, Assessment of observed Rainfall and Temperature Trends over Pakistan for period (1961-2015)", in Science-Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;

xv. Muhammad Arif Goheer participated in and delivered a presentation on Pakistan' NDCs to UNFCCC in Science-Policy Conference on Climate Change organized by Global Change Impact Studies Centre from 18-20 December 2017, Islamabad;

xvi. Muhammad Adnan, Nadia Rehman and Shahbaz Mehmood, Intra & Inter-Annual Variability and Predictability of Rainfall over Monsoon Region of Pakistan", in Science-Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;

xvii. Kaleem Anwar Mir and Shahbaz Mehmood,Assessment of current and projected trends in carbon dioxide emissions from energy sector of Pakistan. Poster presented at the first international Science Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;

xviii. Kaleem Anwar Mir and Shahbaz Mehmood,A fact sheet on greenhouse gas emissions from Pakistan. Poster presented at the first international *science policy conference on climate change (SP3C)*, December 18-20, 2017, Islamabad;

xix. Rida Sehar Kiyani, Romaisa Babar, Sana Nasir, Bushra Khalid, Shaukat Ali, Muhammad Adnan, Analysis of Temporal Variability in the Onset of Summer Monsoon in Pakistan. in Science Policy Conference on Climate Change (SP3C), Islamabad, 18-20 December 2017, Islamabad;

xx. Muhammad Amjad, Evaluation of Regional Spectral Model (RSM) for Prediction of Summer Monsoon over South Asia" at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;

xxi. Amjad M, Fath B, Rovenskaya E (2017) "Ecological Network Model and Analysis for Rawal Lake, Pakistan" at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;

xxii. Ramzan M, Ham S, Amjad M, Chang E and Yoshimura K (2017) "Present and Future climate projections of South Asian surface precipitation using Dynamical Downscaling method" at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;

xxiii. Aftab Ahmad Khan, Inter periodical Comparison of Climate Induced Changes on Crop Water Requirements and Net irrigation Requirements of wheat and maize in D.I. Khan, Southern KPK, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxiv. Aftab Ahmad Khan, Farmers Perception on Climate Change in Bajaur Agency, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxv. Aftab Ahmad Khan and Sher Shah Hassan, The impact of climatic variability on the riparian ecosystem on Qualitative scale in stressed Ecosystem of Kanshi basin of Mangla Watershed, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxvi. Aftab Ahmad Khan, Paper presentation on Appraisal of Irrigation System Performance Using Remote Sensing and GIS Techniques, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxvii. Aftab Ahmad Khan and Sher Shah Hasan, Water Resource Project Assessment

under Climate Change and Water Withdrawals Uncertainties: Case of Nari River, Baluchistan, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxviii. Aftab Ahmad Khan, Impact of the Climate Change on Crop Water Requirements Under RCPs for End-Century in Dera Ismail Khan, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;

xxix. Muhammad Zia-ur-Rahman Hashmi, Discussion on Water-related Disasters and Hydrological Changes, 15 December 2017;

xxx. Aftab Ahmad Khan and Muhammad Arif Goheer, CROPWAT based projection of wheat crop under changing climatic conditions in Punjab, Pakistan in International Conference on Climate Change Threats to Agriculture and Food Security, THINK-ADAPT, November 22-24, 2017, Agriculture University Peshawar;

xxxi. Aftab Ahmad Khan, Muhammad Arif Goheer and Muhammad Ijaz, Spatial and Temporal analysis of surface salinity in Lakki Marwat using geo spatial approaches in International Conference on Climate Change Threats to Agriculture and Food Security, THINK-ADAPT, November 22-24, 2017, Agriculture University Peshawar;

xxxii. Tariq Banuri delivered a keynote presentation on Climate Change and Pakistan speaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;

xxxiii. Muhammad Arif Goheer delivered a presentation on Climate Change and Agriculture: Impacts and Adaptation Prospects speaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;

xxxiv. Muhammad Zia-ur-Rahman Hashmi, Climate change and water resources of Pakistanspeaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;

xxxv. Shahbaz Mehmood, Climate Change; Evidence, past trends and future projections", at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;

xxxvi. Muhammad Arif Goheer participated in and gave a briefing on Work related to second National Communication, organized by MOCC and NEECA, 5 October 2017, Islamabad;

xxxvii. Aftab Ahmad Khan, An Introduction to 1-D and 2-D Hydraulic Analysis Using HEC-RAS, Technical Training Workshop on 24 August, 2017 at NARC Islamabad;

xxxviii. Muhammad Arif Goheer delivered presentation on Greenhouse Gas Emissions from Agriculture, Forestry and Land Use Sector in the Workshop on Greenhouse Gas Inventories organized by Global Change Impact Studies Centre in collaboration with CfRN under CfRN RRR+ Project on 17 July 2017, Islamabad;

xxxix. Arif Goheer delivered presentation on Pakistan's Reporting to UNFCCC in the Workshop on Greenhouse Gas Inventories organized by Global Change Impact Studies Centre in collaboration with CfRN under CfRN RRR+ Project on 17 July 2017, Islamabad;

xl. Shaukat Ali, provided hands-on training to scientific staff of Pakistan Forest Institute (PFI) on climate data downloading, analysis and modeling in the project titled "Studies of tree ring features of some conifers in relation to climate change".

9. Books, Monographs and Published Proceedings of Important Conferences and Workshops (8):

i. Mir, K.A. (2018). Sectoral emission inventory of air pollutants in Punjab. In D. Muchoney, P. Moore, G. Franceschini, M. Ali, M. A. Goheer, S. Mehmood & A. Pervaiz (Eds.), *Remote Sensing for Spatio-Temporal Mapping of Smog in Punjab and Identification of the Underlying Causes Using GIS Techniques (R-SMOG)* (pp. 62 – 73). Pakistan, PK: Food and Agriculture Organization of the United Nations (FAO);

ii. 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;

iii. Aftab Ahmad Khan, Muhammad Arif Goheer, Nuzba Shaheen, Tauqeer Qadir, Shaukat Ali and Muhammad Ijaz (2017) CROPWAT based future projection of crop water and net irrigation requirements for wheat in semi-arid and arid environment of Pakistan under changing climatic conditions in Punjab, Published in the Abstract Book of the International Conference on Climate Change Threats to Agriculture and Food Security, Think-Adapt 2017, November 22-24, 2017, Peshawar;

iv. Aftab Ahmad Khan, Tauqeer Qadir, Muhammad Arif Goheer, Muhammad Ijaz and Saddam Hussain (2017) Assessment of Spatial and Temporal Variations of Soil Salinity using Combination of Remote Sensing and Field Methods in Lakki Marwat, KPK. Published in the Abstract Book of the International Conference on Climate Change Threats to Agriculture and Food Security, Think-Adapt 2017, November 22-24, 2017, Peshawar;

v. Amina Akif, Dr Sherazi, Akif Rahim, Aftab Ahmed Khan, Numan Kashif, The statistical approach to assessment the Hydrological Alternation in The Mangla Watershed of Pakistan, Proceedings THINK-ADAPT, November 22-24, 2017, at Agriculture University Peshawar;

vi. M. Amin, Aftab Ahmed Khan, Abida Perveen, Sher Shah and Zareen Raf, Drought Risk Assessment: A Case Study of Dry Lands, Proceedings THINK-ADAPT, November 22-24, 2017, at Agriculture University Peshawar;

vii. Muhammad Waqar Azeem, Ashfaq Ahmad, Jamshad Hussain, Muhammad Mubashar, Aftab Ahmad and Muhammad Awais, Impacts of Climate Change on Agriculture System of Pakistan;

viii. Climate Change and its Impact on Cotton (Gossypium sp.) in Pakistan, Proceedings Sino-Pak international conference on innovations in cotton breeding and Biotechnology 22-24 November 2017, University of Agriculture Multan.

10. Organization of Scientific Activities at International/ National Level (9):

i. ***Organization of Pakistan's largest climate conference*** On December 18-20, 2017, GCISC organized the Science Policy Conference on Climate Change (SP3C-2017) in Islamabad. For this Conference, GCISC partnered with the COMSATS, the Higher Education Commission (HEC), the University of Utah - USA, the US-Pakistan Centre for Advanced Studies in Water at Mehran

University of Engineering and Technology, Jamshoro (USPCAS-W), the Pakistan Meteorological Department (PMD), the National Disaster Management Authority (NDMA), the Sustainable Development Policy Institute (SDPI), and the Heinrich Böll Stiftung (HBS). The Conference was attended by more than 850 participants representing international and national research organizations, academia, government, media, law, parliamentarians and civil society. The Conference comprised of 45 technical research workshops arranged in 5 parallel sessions covering the themes on Climate Science, Climate & Water, Agriculture & Food Security, Impacts & Adaptation and Mitigation & Policy. The purpose of research workshops was to provide a platform to young researchers to present their latest research findings. Overall, 140 scientific papers were presented in these research workshops. In addition to this, roundtables & side events (9 each), a poster competition and an exhibition were also part of the SP3C 2017. The roundtables and stakeholder side events were chaired by parliamentarians, secretaries to Govt. of Pakistan, eminent scientists and academicians. Many well-known researchers from different universities and research institutions shared their knowledge and research findings on the themes mentioned above;

ii. Organized a session on Climate Change and Its Implications for Pakistan at National School of Public Policy, 27 March 2018, Lahore.

iii. Organization of National seminar on "Preparing Rural Communities to Cope With Climate Change through South-South and Triangular Cooperation" jointly by GCISC/MoCC and IFAD on March 14, 2018, Islamabad;

iv. Organization of meeting on Climate Research and Outreach Agenda for the year 2018, 19 January 2018, Islamabad;

v. Organized a session on Climate Change and Its Implications for Pakistan at National School of Public Policy, 23 October 2017, Lahore;

vi. Organization of Joint NCP-GCISC Workshop on Introduction of Degree Program on Atmospheric Sciences/ Earth System Physics in Universities, 14 September 2017, Islamabad;

vii. Organization of a meeting of University Consortium jointly with Higher Education Commission, August 08, 2017, Islamabad;

viii. Field Assessment for climate change adaptation at local level in the Gilgit watershed at Gilgit from 19-26 July, 2017;

ix. Organization of National Workshop on Greenhouse Gas Inventories under CfRN Reporting for Results based REDD+ project, Serena Hotel, 18 July 2017, Islamabad;

11. Effort on capacity building of GCISC young scientists through academic and specialized trainings and participation conferences, workshops etc at National level (53):

i. Muhammad Arif Goheer, Meeting of the committee on Water organized by Ministry of Water Resources, 29 June 2018

ii. Shahbaz Mehmood-Workshop on progress of PSF-NSFC joint project at main conference hall, PMD Headquarter Office Title: Projection and Attribution of Stream Flow Composition at Mountain Rivers in China and Pakistan- 27-28 Jun 2018;

iii. Amjad Masood-Workshop on progress of PSF-NSFC joint project at main conference hall, PMD Headquarter Office Title: Projection and Attribution of

Stream Flow Composition at Mountain Rivers in China and Pakistan- 27-28 Jun 2018;

iv. Muhammad Arif Goheer, workshop on Sustainable Food Systems under Climate Change in South Asia, June 26-28, 2018, Islamabad;

v. Muhammad Ijaz, International workshop on "Options for an Energy Mix: issue of cost & sustainability by COMSTECH Secretariat- 26-28 Jun 2018;

vi. Amjad Masood-Participation in International Conference and 6th Regional Technical Group Meeting (RTG-6) by NDMA- 20-22 Jun 2018;

vii. Muhammad Amjad, Participation in International Conference and 6th Regional Technical Group Meeting (RTG-6) by NDMA- 20-22 Jun 2018;

viii. Muhammad Zia-ur-Rahman Hashmi-High Level Meeting on State of research on GIS and Space Applications, Potential Uses and Impact by Planning Commission at HEC- 13 Jun 2018;

ix. Muhammad Arif Goheer and Muhammad Ijaz, Participation in Consultative Training Workshop for Validating FRELs & NFMS and design of REDD+ PES for Pakistan by REDD+ Coord, MoCC- 11-12 Jun 2018;

x. Amjad Masood - International Conference on Seawater Desalination for Water Supply and Agricultural Applications - Options for Pakistan at PPMI Islamabad on 24 May 2018;

xi. Shahbaz Mehmood, Nadia Rehman, Qudsia Zafar, Kaleem Anwar Mir & Mubashar Dogar-Participation in open house - NUST-SNS Department of Physics- 23 May 2018;

xii. Muhammad Arif Goheer, Consultative Roundtable on REDD+ organized by SDPI, 21 May 2018, Islamabad;

xiii. Muhammad Arif Goheer-Participation in Consultative meeting to review contents of Mitigation analysis chapter of Second National Communication by NEECA-10 May 2018;

xiv. Muhammad Arif Goheer, Shahbaz Mehmood, Muhammad Ijaz and Kaleem Anwar Mir, Workshop on BUR1 Project, organized by Ministry of Climate Change, 9 May 2018, Islamabad

xv. Muhammad Arif Goheer-Workshop on Climate Resilient Development by Planning Commission, M/o Planning, Development and Reforms- 8 May 2018;

xvi. Amjad Masood, Participation in Training workshop on Flood Management through Flood Early Warning and Forecasting System" by UNESCO at Margala Hotel Islamabad - 2-4 May 2018;

xvii. Muhammad Zia-ur-Rahman Hashmi, Training Workshop on Collective Community Action for Eco-Watershed Mitigation to Floods and Drought" on 1-2 May, 2018, Margala Hotel Islamabad;

xviii. Aftab Ahmad Khan, Training on Climate Change and Disaster Risk Reduction at NARC Islamabad- 30Apr-4May 2018;

xix. Muhammad Zia-ur-Rahman Hashmi-Participation in seminar as Guest Speaker "Climate Vulnerability Assessment and Adaptation of Water Systems" by MUET Jamshoro- 27 Apr 2018;

xx. Muhammad Arif Goheer, 5th Meeting of the National Climate Change Policy Implementation Committee (NCCPIC) at MoCC – 17 Apr 2018;

xxi. Shaukat Ali-Visit to Pakistan Forest Institute as Resource Person in study of Climate Change 12-13 Apr 2018;

xxii. Aftab Ahmed Khan-Consultation workshops of the national REDD+ working groups for NFMS and FRELs, National REDD+ strategy, ESMF, FGRM and Capacity building on SIS- 10-13 Apr 2018;

xxiii. Shahbaz Mehmood, Participated in Technical Session on OZONE2CLIMATE (O2C) Technology Roadshow & 25th Pakistan HVACR Expo & Conference - 2018 by MoCC (National Ozone Unit)- 5-7 Apr 2018;

xxiv. Aftab Ahmed Khan-Training on Satellite Land Monitoring Systems, organized by REDD+ in Islamabad from 13-15 March 2018;

xxv. Muhammad Arif Goheer-Seminar on Preparing Rural Communities to Cope with Climate Change through South-South and Triangular Cooperation- 14 Mar 2018 organized by GCSIC, Ministry of Climate Change and IFAD, Islamabad;

xxvi. Muhammad Arif Goheer-Consultative workshop on improving agriculture extension services in Pakistan organized by FAO from 8-9 March 2018, Islamabad;

xxvii. Muhammad Arif Goheer, Pollutants inventory in a half day meeting on R-SMOG organized by FAO in Islamabad 28 February 2018;

xxviii. Muhammad Arif Goheer gave a briefing on the Second National Communication in the meeting organized by NEECA and MoCC on 28 February 2018, Islamabad;

xxix. Muhammad Arif Goheer participated in a workshop on 'Pakistan in 2047' organized jointly by World Bank and Sustainable Development Policy Institute on 26 February 2017 in Islamabad;

xxx. Muhammad Zia-ur-Rahman Hashmi, Shahbaz Mehmood, Nuzba Shaheen, Muhammad Amjad and Shaukat Ali, International conference on "Climate Change Adaptation Policy and Science-CCAPS at PARC- 26-27 Feb 2018;

xxxi. Muhammad Zia-ur-Rahman Hashmi, Amjad Masood & Aftab Ahmed Khan - United Nations/Pakistan/PSIPW 4th International Conference on Space Technology for Water Management hosted by SUPARCO on behalf of the Government of Pakistan at Serena Hotel Islamabad from 26 Feb to 02 Mar 2018;

xxxii. Khalid Mahmood-Launching ceremony of commemorative stamp of green Pakistan Programme- 12 Feb 2018;

xxxiii. Tariq Banuri, Muhammad Arif Goheer, Shahbaz Mehmood and Muhammad Zia-ur-Rahman Hashmi-Meeting on 'Climate Research & Outreach Agenda for 2018',19 Jan 2018;

xxxiv. Amjad Masood-Workshop on Role of Ulema in Climate Change Awareness- 28 Dec 2017;

xxxv. Muhammad Arif Goheer and Aftab Ahmad Khan "Improving skills for promoting sustainable watershed management practices in South Asia" December 26-28, 2017 with NARC;

xxxvi. All GCISC Technical Staff, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Marriot Islamabad;

xxxvii. Muhammad Arif Goheer-4th Meeting of the National Climate Change Policy Implementation Committee (NCCPIC) at MoCC – 11 Dec 2017;

xxxviii. All GCISC Technical Staff, Sustainable Development conference organized by Sustainable Development Policy Institute from 5-8 December 2017, Islamabad;

xxxix. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, Training program on "Water Quality Management" at NCBI by PCRWR- 4-8 Dec 2017;

xl. Muhammad Amjad-1st Meeting of the Working Group on Physical Infrastructure and Energy for 12th Five Year Plan- 6 Dec 2017;

xli. Muhammad Ijaz and Aftab Ahmad Khan, Expert Meeting on Pakistan GCF

Concept Note, "Transforming the Indus Basin with Climate Resilient Agriculture and Climate-Smart Water Management, 28 November, 2017 FAO, Islamabad;

xlii. Muhammad Arif Goheer participated in Consultative Dialogue Report Launching Ceremony organized by jointly by Ministry of Climate Change Civil Society Coalition for Climate Change on 26 October 2017, Islamabad;

xliii. Muhammad Ijaz, National Training of Trainers (ToT) on Satellite Land Monitoring System (SLMS)- 20-23 Nov 2017;

xliv. Kaleem Anwar Mir, Technical training workshop: Practical use of the Energy Sector Carbon Impact Modelling tool developed for the Ministry of Energy- 24-26 Oct 2017;

xlv. Tariq Banuri, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi and Shahbaz Mehmood, Joint NCP-GCISC Workshop on Introduction of Degree Program on Atmospheric Sciences/ Earth System Physics in Universities, 14 September 2017, Islamabad;

xlvi. Muhammad Zia-ur-Rahman Hashmi-Workshop on Hydraulic Analysis Using HEC-RAS by PCRWR at NARC, Islamabad 24 Aug 2017;

xlvii. Muhammad Arif Goheer, Mitigation experts working group meeting-technology needs assessment (TNA) Islamabad by MoCC- 15 Aug 2017;

xlviii. Muhammad Arif Goheer, Fourth meeting of national REDD+ working groups by MoCC & REDD+- 7-8 Aug 2017;

xlix. Tariq Banuri, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi and Shahbaz Mehmood, Workshop on University Consortium organized jointly by GCISC and Higher Education Commission on 08 August 2017, Islamabad;

l. All GCISC Technical Staff, Collaborative meeting with the Delegation from University of Utah-USA, 7 August 2017, Islamabad.

li. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, UNESCO Sponsored International Conference on "Water Processing for Sustainable Development", NUST, Islamabad, 1 - 2 August 2017;

lii. Muhammad Arif Goheer, Meeting with FAO mission to Pakistan for the transformation to climate smart Agriculture: increasing farmer resilience to drought and reducing carbon emissions in climate-vulnerable areas of Pakistan at GCISC- 25 Jul 2017;

liii. Muhammad Ijaz & Kaleem Anwar Mir-National Workshop on greenhouse gas inventories organized by GCISC and CfRN at Serena- 18 Jul 2017;

liv. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, UNESCO Sponsored Advanced Training Course on "Remote Sensing and GIS Applications in Flood Management", 18 - 31 July 2017, NUST, Islamabad.

12. Contributions to Research Projects:

i). "Remote sensing for Spatio-temporal mapping of smog in Punjab and identification of the underlying causes using GIS techniques (R-SMOG)". A Joint study with Food and Agriculture Organization, (FAO), Pakistan;

ii). Pak-SNC (2018). "Pakistan's Second National Communication (Pak-SNC) on climate change project" under United Nations Framework Convention on Climate Change (UNFCCC) by Ministry of Climate Change (MoCC), Government of Pakistan;

iii). Climate smart agriculture through sustainable water use management: Exploring new approaches and devising

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

iv). Development of of Food Security and Nutrition Information System (FSNIS)/ Food Security Monitoring System, A joint study with Food and Agriculture Organization, (FAO), Pakistan;

v). Project on the Preparation of Background papers for GCF project proposal 'Transforming of the Indus Basin with the Introduction of Climate Resilient Agriculture and Sustainable Water Management' awarded to GCISC by Food and Agriculture Organization (FAO), Pakistan;

vi). GLOF and Climate Change Risk and Vulnerability Assessment Study for FWO Hydropower Projects in Chitral;

vii). Consultancy Services provided by one scientist for Asia Development Bank (ADB) project titled "Climate Risk and Vulnerability Assessment (CRVA) in Bajaur, Khyber, and Mohmand Agencies of Pakistan 2018";

viii). "Impact of debris cover thickness and temperature variations on glacier melting (in relation to Karakoram Anomaly) in the Upper Indus Basin" with Chinese Academy of Sciences and International Centre for Integrated Mountain Development (ICIMOD);

ix). Strengthening of GHG inventory for Agriculture, Forestry and Land Use (AFOLU) Sector under Coalition for Rainforest Nations (CfRN) technical support under reporting for Results Based REDD+;

x). APN Project on Improving Skills for Promoting Sustainable Watershed Management Practices in South Asia.

13. Mass Awareness / Media Appearance:

- One scientist appeared on Express TV for interview on Climate Change impacts over Pakistan on 25 April 2018;
- Muhammad Arif Goheer, Head-Agriculture & Coordination appeared in Radio Pakistan Live Programme on 'Raabta' 10.05-11.00am on January 02, 2018 and talked on the need of climate change research for impactful actions;
- Interviews of Tariq Banuri, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi and Shahbaz Mehmood on Climate Change, Food, Water and Energy Security issues telecasted on SDTV.
- GCISC is managing Facebook Group for the awareness of researchers on climate change issues;

14. Key Achievments / Contributions to International Efforts:

- Key Contribution to Pakistan's Second National Communication (SNC);
- Prepartion of National Greenhouse Gas Inventory report (2014-15);
- Observer status of GCISC by the Intergovernmental Panel on Climate Change (IPCC). GCISC is the 1st organization in Pakistan to get this status;
- GCISC became IUCN member in January 2018;
- Two GCISC scientists contributed as Lead Authors in IPCC to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
- Two GCISC scientists contributing as lead Authors to contribute to IPCC 6th Assessment Report on climate change;

- GCISC was represented in UNFCCC Conferenc of Parties (COP-23) in November 2017;
- GCISC and Collaborating institutes like (PARC, PCRWR, PMD, NIH, FFC, NUST, HEC, UET-Peshawar, UAF, PSF) agreed to form an Advisory Group for Research and Capacity Building on Climate Change, for which GCISC serves as the secretariat. The Advisory Group agreed to launch five collaborative projects related to (a) future scenarios in Pakistan for different degrees of global warming (i.e., 1.5 degrees, 2 degrees, 3 degrees, etc.); (b) Action on Pakistan's INDC's consistent with national goals and objectives (this will include energy targets as well as those in agriculture and land use); (c) disaster management under the impact of climate change; (d) climate finance; and (e) from climate policy to implementation;
- Prime Minister of Pakistan approved a plan to enhance the capacity of the Center, through training, technical assistance, collaborative research, partnership development, and enhanced communication and dissemination of research outputs. The implementation of the Prime Minister's directive includes the approval of plans to restructure the institution, signing of partnership agreements with key national entities, developing collaborative agreements with leading universities, recruitment of international experts as research advisors, recruitment of additional personnel, engaging the involvement of the Pakistani diaspora, and the organization of Pakistan's largest-ever scientific conference on climate change. These actions are designed to improve the quality of research and policy advice available to the government;
- Approval by the BoG to restructure the Centre along the well-known IPCCclassifications namely (a) Climate Science, Climate modelling and Climatology(which will be based on the current climatology section); (b) Climate impacts andadaptation (which will bring together the current sections of agriculture and water);and (c) Climate mitigation, climate financing, and climate economics;
- One scientist received Excellence Award in UNFCCC-GIR-CASTT Programme on GHGs based on outstanding performance in the 2018 UNFCCC-GIR-CASTT Programme on Greenhouse Gases, held in Republic of Korea.

15. Organization of Seminars:

GCISC organized a number of Seminars for sharing of information/ enhancement of scientific knowledge of its researchers.

i. Financial Planning for Energy Security in Pakistan - The Way Forward for Renewable Energy, Dr. Seeme Mallick, Ph.D. Env. Economics- 29 June 2018;
ii. Brief overview of the recent IPCC Expert Meeting on Assessing Climate Information for Regions, Muhammad Adnan, Statistical Climatology Researcher at GCISC- 01 June 2018;
iii. Envisioning user-friendly natural resources remote sensing products for dissemination, and decision making on climate change in Pakistan, Dr. Hammad Gilani, 25 May 2018;
iv. IPCC's GHG Inventory Guidelines Updation Process 2019: Experiences as a Lead Author, Muhammad Arif Goheer, Head Agriculture & Coordination, GCISC- 11 May 2018;

v. Experiences from "Energy Transition Visiting Program (23-27 April 2018)" organized by HBS Germany, Muhammad Amjad, Senior Scientific Officer, GCISC- 04 May 2018;
vi. Global Change and Response for Sustainable Water Resources Management, Dr. Hassan Abbas, Chairman ZiZAK (Pvt) Ltd- 27 April 2018
vii. Impact of the 21st Century Climate Change on Surface Water Availability of the Transboundary Kabul River Basin, Dr. Zia Hashmi, Head Water Resources & Glaciology, GCISC- 20 April 2018;
viii. Mapping Air Pollution Using Geospatial Technologies, Sahibzada Saadoon Hammad, Research Assistant, GCISC- 13 April 2018;
ix. Sustainable Land Management Programme to Combat Desertification in Pakistan, Abdul Hamid Marwat, National Program Coordinator, Sustainable Land Management Program- 6 April 2018;
x. 'Application of Sediment Transport and Reservoir Operation Modeling for Sustainable Water Resources Management" (Post Visit Seminar about USAID Training course held at Hydrologic Engineering Center, USA), Aftab Ahmad Khan and Muhammad Arif Goheer, GCISC- 30 March 2018;
xi. Hydro-Economic evaluation of Surface water reservoirs on Indus River System, Haris Mushtaq, Research Assistant, LEAD Pakistan- 16 March 2018;
xii. Climate change risk perceptions, impacts and adaptation: A farmer's perspective from Punjab, Pakistan, Dr. Muhammad Abid, CCRD, COMSATS IIT, Islamabad- 9 March 2018;
xiii. 'Tailored WRF Regional Climate Modeling for Hydrologic Impact Applications over Pakistan" - Post Visit Seminar about USAID Training held at National Center for Atmospheric Research (NCAR), Boulder-Colorado, USA, Shahbaz Mehmood and Muhammad Amjad, GCISC- 2 March 2018;
xiv. A Statistical Downscaling Model for Summer Rainfall over Pakistan, Dr. Dildar Kazmi, Meteorologist at National Agromet Centre, Pakistan Meteorological Department- 23 February 2018;
xv. Karakoram cryosphere: Glacial lakes and associated threats, Dr. Muhammad Ashraf, Expert in Glacier studies, Ex-GMRC-WAPDA- 15 February 2018;
xvi. Scenario generation at farm level using R codes for AgMIP Pakistan, Burhan Ahmad, Meteorologist, PMD- 9 February 2018;
xvii. Exploring Water-Energy-Food Nexus in Pakistan through a System Dynamic Modelling Approach, Danyal Aziz, GCISC Researcher- 2 February 2018;
xviii. Karakoram cryosphere: Glacial lakes and associated threats, Dr. Muhammad Ashraf, Expert in Glacier studies, Ex-GMRC-WAPDA- 26 January 2018;
xix. Soot emissions as a significant contributor to global warming, Nasreen Farah, Chief Scientific Officer, HDIP- 12 January 2018;
xx. Planning and Assessment of Water Resource Projects in an uncertain climate future: Application of hydro-economic simulation Framework, Saba Batool, MS student at PIDE Islamabad- 5 January 2018;
xxi. Present and future climate projections of South Asian surface precipitation using dynamical downscaling method, Mehwish Ramzan- 29 December 2017;
xxii. Genetics of water deficit tolerance in wheat (Triticum aestivum L.), Dr. Kashif Rashid, Ph.D. PBG; University of Agriculture Faisalabad- 8 December 2017;
xxiii. Hydrological Projections and Reservoir Management, Statistical Downscaling of the Process-based Climate Models for the Upper Indus Basin, Dr. Firdos Khan- 24 November 2017;

xxiv. Spatial Flood Risk Analysis of Chenab River from Marala to Qadirabad based on MCDA Approach, Engr. Sher Shah, BS Student, Agricultural Engineering Department, University of Engineering & Technology (UET), Peshawar- 17 November 2017;

xxv. Precipitation distribution and synoptic patterns in Austria under climate change conditions, Asma Yaqub, Research Scientist at the Institute of Meteorology, University of Natural Resources and Life Sciences, Vienna, Austria- 10 November 2017;

xxvi. Climate Change Scenario: From Climate Model Ensemble to Local Indicators, Dr. Imran Nadeem, Institute of Meteorology (BOKU-MET), Austria- 3 November 2017;

xxvii. Special Presentation Session - Development of an Energy Sector Modelling Emission Forecasting Tool for Pakistan, Kaleem Anwar Mir, Scientific Officer, GCISC- 2 November 2017;

xxviii. Community-Government Partnership for Metered Clean Drinking Water: A Case Study of Bhalwal Pakistan, Muhammad Naveed Iftikhar, Ph.D. Candidate at the University of Delaware, USA- 27 October 2017;

xxix. Progress of recent research visits to China and Japan (related to Climate modelling) and future research directions, Dr. Shaukat Ali, Senior Scientific Officer, GCISC- 20 October 2017;

xxx. Overview of Climate Change Studies at CAEWRI-NARC/PARC, Dr. Bashir Ahmad, Principal Scientific Officer, Climate Change Alternate Energy and Water Resources Institute (CAEWRI), NARC/PARC- 13 October 2017;

xxxi. Key Highlights of recently held "2nd Lead Authors' Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventory Preparation" in Victoria Falls, Zimbabwe, Muhammad Arif Goheer and Muhammad Ijaz, GCISC- 6 October 2017;

xxxii. Soil Erosion Modelling to Estimate Land Degradation Risks at National Level, Mudassar Maqsood, Associate Programme Coordinator, River Basin Management at ICIMOD- 29 September 2017;

xxxiii. Forest Land Use Change Assessment for REDD+ Monitoring, Reporting and Verification System in Pakistan, Iqra Atif, PhD student (near completion) at IGIS-NUST- 22 September 2017;

xxxiv. Assessing climate change impacts on water demands: Clout of baseline scenario and key climate variables, Dr. Zaigham Habib, A Freelancer Researcher- 15 September 2017;

xxxv. Women and Climate Change in Pakistan, Khawar Mumtaz, Chairperson of the National Commission on the Status of Women (NCSW)- 8 September 2017;

xxxvi. Flood Risk Management in a Changing Climate, Dr. Imran Saqib Khalid, Research Fellow, Sustainable Development Policy Institute, Islamabad- 25 August 2017;

xxxvii. Climate Change and Water Cycle Variability - Application of Hydrological and Hydraulic Modeling, Dr. Shakil Ahmad, Assistant Professor, NUST Inst. of Civil Engineering- 18 August 2017;

xxxviii. Food Security under Changing Climate Concerns, Dr. Mohsin Iqbal, IPCC Lead Author and former GCISC Section Head- 11 August 2017;

xxxix. Assessment of Effects of Climatic Conditions on Ambient Air Quality, Dr. Anjum Rasheed, CCRD COMSATS IIT- 4 August 2017;

xl. Community perception about changing climate and local adaptation in Gilgit River watershed, Zia Hashmi and Amjad Masood, GCISC- 28 July 2017;
xli. Who Will Think Outside the Sink? Farmers' Willingness to Invest in Technologies for Groundwater Sustainability in Pakistan, Junaid Alam Memon, Ph.D. (Assistant Professor at Pakistan Institute of Development Economics, Islamabad)- 21 July 2017;
xlii. Policy Perspective of Energy-Water Nexus for Rural Areas - Case Study of Multan, Punjab, Dr. Sardar Mohazzam, (UNDP Lead Consultant)- 14 July 2017;
xliii. "Hydro-climatic Studies Biases in the Hindukush-Karakoram-Himalayan Basins", Dr. Asif Khan, Assistant Professor, KPK UET Peshawar- 5 July 2017;
xliv. Estimating Glacier Melt Rates in the Himalayas, Jewell Lund, Graduate Student, University of Utah- 4 July 2017;
xlv. Role of urban Environmental Gradients in Dengue transmission in Pakistan, Dr. Bushra Khalid, Post Doc, IIASA- 3 July 2017.

16. Other Important Assignments:

General Administrative/ Technical Functioning:

- Organized 5th Meeting of Board of Governors held on 22 December 2017 and sought approvals from BoG-GCISC for Various Administrative and Technical matters related to the functioning of the Centre;
- Organized 4th Meeting of Board of Governors held on 17 July 2017 and sought approvals from BoG-GCISC for Various amendments in GCISC Act 2013, GCISC Audit, capacity building programme and restructuring of the Centre;
- Draft GCISC Employees Service Rules after vetting by Establishment Division were submitted to Ministry of Climate Change for seeking vetting/ approval from Ministry of Finance;
- Submission of response 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;
- Prompt actions were taken and required information/ Reports were submitted to concerned quarters. Various in-house seminars and trainings events were successfully organized and the capacity of the scientists was built;
- Appointment of Executive Director GCISC through Search Committee constituted by the Prime Minister was carried out and Dr Tariq Banuri assumed the charge of the post of ED-GCISC in June 2017 and served till March 2018.

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