YEAR BOOK

2018-19

Government of Pakistan
Ministry of Climate Change
Islamabad

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Message from the Special Assistant to the Prime Minister on Climate Change

An overwhelming majority of scientists, experts, and professional scientific organizations related to earth sciences agree that evidences are sufficient that climate change is real. Some may still deny this overwhelming judgment of science, but none can deny the devastating impact of increase in frequency and intensity of climate extremes. Further, most of the experts agree that the major cause is human activities, which include a complex interaction with the natural environment coupled with social and economic changes that are increasing the heat trapping CO2 and other greenhouse gases (GHG) in the atmosphere, which are increasing global temperature and in turn causing climate change.

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

(MALIK AMIN ASLAM)
Special Assistant to the Prime Minister on Climate Change

Foreword

In pursuance of Sub Rule (2) of Rule 25 of the Rules of Business 1973; the Ministry of Climate Change has prepared and uploaded on its website Year Book 2017-18. The book contains material about its functions, activities and achievements of the Ministry and its attached departments for the information of Cabinet and all Ministries.

Climate change is one of the most daunting threats that the world faces today. For Pakistan, it is a colossal challenge to achieve its sustainable development goals without compromising on its socio-economic development needs. Due to its exposure to the recurrent episodes of drought, flooding, heatwaves and glacial lake outburst floods in the past few decades, the country is consistently ranked as being a highly vulnerable to the impacts of climate change by multiple climate change vulnerability indices.

Year Book 2018-19 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.

(MS. NAHEED S. DURRANI)
Secretary

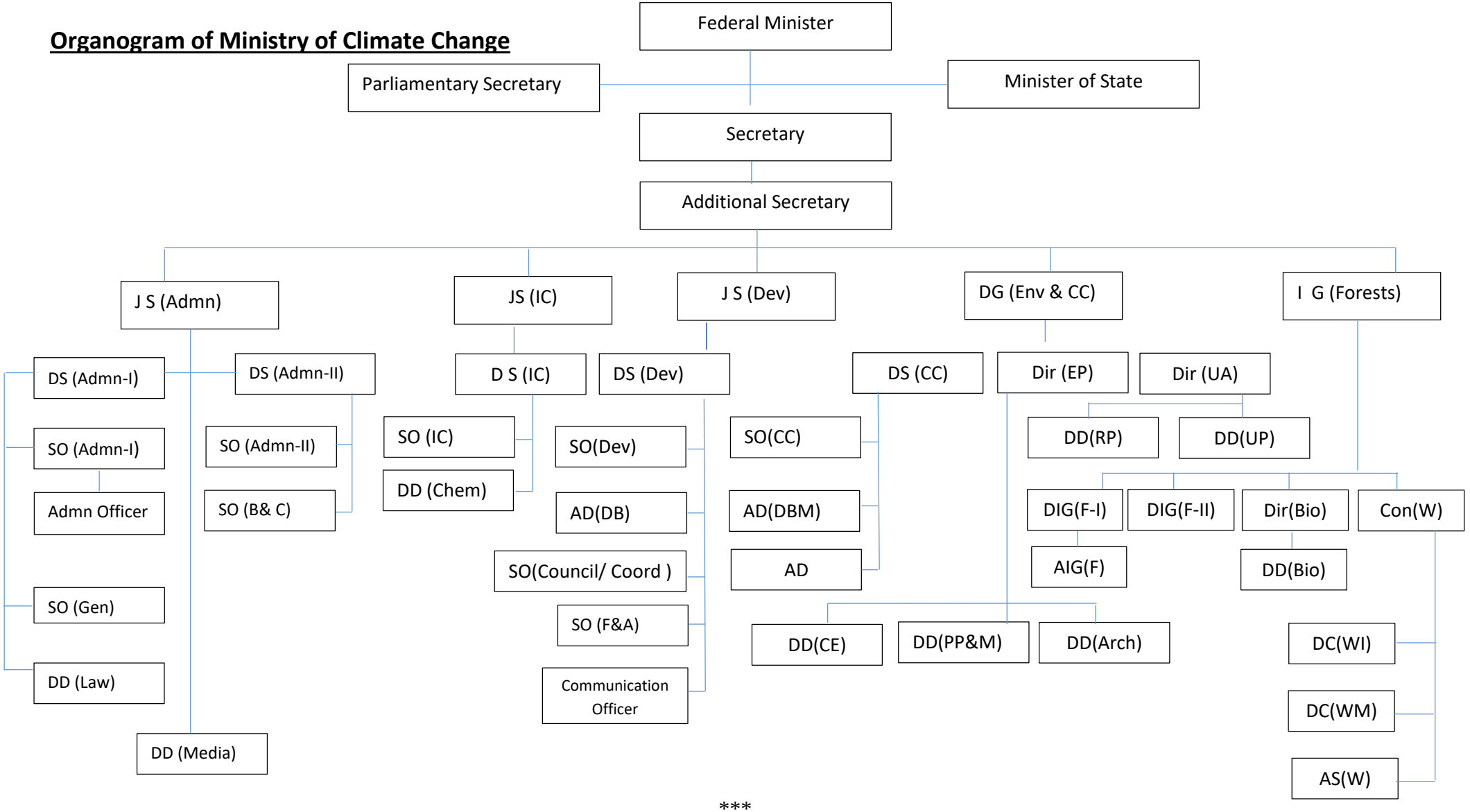
1. Administration Wing

Total strength of the Climate Change Division during year 2018-19 under report is 192 employees (52 officers and 140 staff members).

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

1. Personnel Administration of the officers / officials of the Division.
2. Personnel administration of officers of the attached departments/organizations / projects.
3. Budgetary (non-development) and financial matters of the Division and its attached department/organizations.
4. Matters relating to audit, Public Accounts Committee (PAC) and Department Accounts Committee (DAC).
5. Coordination between wings of this Division and with other Ministries/Divisions.
6. Matters relating to hiring of residential accommodation.
7. Re-imbursement of medical charges to the serving / retired officers/ officials.
8. Maintenance of PER record of all employees of this Divisions and attached departments and maintenance of annual declaration of assets.
9. Processing promotion, pay and pension cases of the officers / officials of the Ministry and its attached departments.
10. Trainings, conferences, seminars and visits abroad.

Organogram of Ministry of Climate Change



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2. Development Wing

1. PSPD project titled. "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 hac in 14 districts covering more than 200 villages. The integrated activities will be performed in Agriculture, Forest, irrigation, livestock, rangelands and soil conservation/stabilization sectors.

Project Districts:

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

Detail of Project fund's donors is given below:

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
Government of Balochistan (ADP)	200.00
Community share (in kind)	239.430
G.Total	1666.695

Allocation and Expenditure FY-2018-19 (Rs. In Millions)

Total PC-I Allocation	Allocation (2018-19)	Surrender (2018-19)	Expenditure (2018-19)
105.43	22.000	5.65	16.027

Achievements:

S #	Activity Name	Achievements
1	Construction of Water Pond;	20 ponds
2	Establishment of Water Conveyance System	20 Conveyance System
3	Rangeland Development/ Reseeding	32 Acres
4	Dry afforestation on Farmland	75 Acres
5	Agro-forestry through Shelterbelt	36 Av Km
6	Raising of Woodlots	195 Acres
7	Establishment of Fruit Trees	02 fruit nurseries
8	Agro-forestry through Shelterbelt	15 Av Km
9	Raising of Woodlots on 30 Acres	30 Acres
10	Capacity Building of Rural Farmers/Community activists in SLM field	50 Nos
11	Construction of earthern rain water harvesting ponds	20 No
12	Earthern Bunds / Kamara system	5 No

13	Energy Plantation	49 Acres
14	Farm-based livlihood activities for women	68 No
15	Farmer Nurseries	09 No
16	Farmland Water spillways	09 No
17	Fruit orchards with Pipe irrigation system (water storage and peter engine)	15 No
18	Gated structures on gandis	7 No
19	Range management plans	5 No
20	Reseeding of palatable grasses	148 Acres
21	Sand dune stabilization (Kana cultivation)	161 Acres
22	Spurs and retaining walls	20 No
23	Shelter belts/wind-breaks	5 Km
24	Farmer nurseries (including home-based nurseries)	02 No
25	Earthern Bunds / Kamara system	02 No
26	Intel structures on farm level	30 No

2. 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 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.

Spatial Reference System (SRS)

A spatial reference system defines a specific map projection, as well as transformations between different spatial reference systems. Geomatic Centre 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;

Environmental planning and management with GIS and SRS

Geomatic Centre Enhanced and upgraded the institutional capacity of Pak-EPA, Ministry of Climate Change in the use of SRS, GIS and GPS for environmental monitoring and management and Collaborate with GIS & SRS department of partner universities / sector institutions in research oriented projects. Geomatic project supported 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. Geomatic Centre facilitated 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. Geomatic Centre Provided 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.Allocation for the year 2018-19 (very brief)

Major activities performed during 2018-2019:

Approved Cost	48.885 (Local)	
Revised Cost:	Nil	
Allocation 2018-19	**Allocation (Local)**	**Expenditure**
	Rs. 18.205 million	Rs.14.907 million

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.

3. Project titled "Green Pakistan Programme Strengthening Zoological Survey of Pakistan" under Green Pakistan Programme

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.

The project was approved on 17th January, 2017 and started from 1st July, 2017 and will end on 30th June 2019. The total cost of the project is Rs: 87.726 million. The project has been revised and extended up to June, 2023

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 2018-19

Workshops:

1. Inception workshop was organized and all the stake holders were invited to participate.
2. Training session on Field Research and Data Collection held with Quaid-e-Azam University Islamabad.
3. Workshop on standardization of survey techniques for preparation of Red Data Book was held to gain inputs from academia regarding red data book preparation and its way forward

Field Surveys:

Following field surveys have been carried out under the project umbrella:

- Field Survey for Punjab Urial at Lehri Nature Park
- Survey of Deosai National Park with Specific Reference to Endangered Fauna
- Baseline Survey of Machiara National Park, AJK
- Field Survey for Punjab Urial at Chumbi Surla and Jalalpur Wildlife Sanctuaries
- Field Survey for Vultures at District Kotli and Mirpur (AJK)
- Field Survey at Kirthar National Park (Ungulates), Haleji Lake (Marsh Crocodile) and Nagar Parkar (Vultures) in Sindh Province.

  (i): Ungulates and other fauna survey at Kirthar National Park:

  (ii) Marsh Crocodile at Haleji Lake

  (iii): Vulture Census at Nagar Parkar:

Database Development:

Website of Zoological Survey of Pakistan prepared and uploaded

4. PSDP project titled, "Green Pakistan Programme-Revival of Forestry Resources in Pakistan"

The project 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

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. Allocation for financial year 2018-19 is as under:-

PROVINCES	PSDP (PC-1)	ADP	Total (PSDP+ADP)
PUNJAB	132.378	157.19	289.564
SINDH	67.795	87.52	155.315
BALOCHISTAN	18.254	36.263	54.517
KPK	51.999	53.498	105.497
GB	53.64	0	53.64
AJK	0	0	0
FATA	28.55	0	28.55
NSSU/ZSP/Federal Component	24.376	0	24.376
Total	376.992	334.47	711.459

The achievements for FY 2018-19 are as under:

Total plants planted, sown and regenerated in plantations and enclosures is 33.065 million plants and total planting stock established in nurseries is 22.005 million.

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. The 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 Gilgit Baltistan;

vii. 254 meter of diversion channels constructed to divert water from streams to marginal waste lands for afforestation in Gilgit Baltistan;

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.

5. Green Pakistan Programme–Revival of Wildlife Resources in Pakistan

The main aim of the project is to revive and functionally reorganize wildlife departments at provincial level including AJK, GB and Fata focusing on three major areas i). Reorganization of wildlife departments through time bound plans, ii). Capacity building of provincial wildlife departments and iii). Improve performance regime through incentivized mechanism.

Physical Progress

a. Reorganization of wildlife departments through time bound plans

Project Directors have been hired in all provinces and territories except Sindh. In Sindh, the Chief Conservator Sindh is acting as a focal person for the time being; however the

notification from Sindh Wildlife Department is awaited still. Technical and support staff hiring for the smooth implementation of this project is still in process in AJK and KPK.

b. Capacity building of provincial wildlife departments

This objective includes strengthening of respective wildlife departments through hard and soft means. It involves the procurement of vehicles, motorcycles and field and office equipment. It also involves the establishment of one central and eight regional GIS labs. This component also aims on capacity building of departmental technical staff through trainings, workshops and exposure visits for staff.

Allocation for financial year 2018-19 is as under:-

PROVINCES	PSDP (PC-1)	ADP	Total (PSDP+ADP)
PUNJAB	22.556	22.56	45.112
SINDH	20.84	20.84	41.679
BALOCHISTAN	4.9	4.9	9.8
KPK	68.722	68.72	137.443
GB	26.392	0	26.392
AJK	0	0	0
FATA	26.414	0	26.414
NSSU/ZSP/Federal Component	1.1	0	1.1
Total	170.924	117	287.94

Achievements

i. All Project Directors have been hired in all the provinces and territories except Sindh. Conservator Sindh is acting as a focal person for the time being; however the notification from

Sindh wildlife department is awaited still. Technical and supporting staff have been hired for the smooth implementation of this project.

ii. Wildlife departments has been strengthened through hard and soft means. It involves the procurement of vehicles, motorcycles and field and office equipment's. It also involves the establishment of one central and eight regional GIS labs. Capacity building of departmental technical staff through trainings, workshop's and exposure visits for staff.

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.

6. PSDP Project titled, "Construction of Boundary Wall of Zoo-Cum Botanical Garden Islamabad"

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.

- 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.

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

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 2018-19, all the 14 km area, cleared and boundary wall has been completed. In the next phase development of the Zoo-cum botanical garden will be carried out and a state of art botanical garden will be developed.

Activities Undertaken for Ten Billion Tree Tsunami Programme (TBTT) Through Green Pakistan Programme

Initiative

Pakistan has taken this initiative to overcome the excessive degradation of forests and wildlife resource through sustainable management approach. The present initiative is built on the successful and powerful initiative to plant Billion Trees under the Billion Trees Afforestation Project (BTAP) by the then government in Khyber Pakhtunkhwa Province in 2015.

In consultation with provincial governments, it was decided to set a goal of Ten Billion Tree Plantation, in a phased manner, across country. The project is expected to deliver dividend in preserving atmosphere, reducing greenhouse gas effects, decrease intensity of random floods, lowering rains, droughts and enhancing other biodiversity supportive actions. The initiative not only includes tree planting / regeneration but also supports implementation of Target 15 of the

Sustainable Development Goals by preventing degradation of forestland and improving aquifer.

Fig 3. Inauguration of TBTTP on 2nd September, 2018 at Makhniyal

Prime Minister of Pakistan inaugurated the 'Ten Billion Trees Tsunami Programme' on 2nd September, 2018 during "Plant for Pakistan Day" event. The main objective of the project is to facilitate transition towards environmentally resilient Pakistan by main streaming notations of adaptation and mitigation through ecological targeted initiatives covering afforestation, biodiversity conservation and enabling policy environment.

Fig. 4 (a): Plant for Pakistan Day, 9th February 2019 at Balloki Headworks

Fig. 4 (b): Plant for Pakistan Day, 9th February 2019 at Balloki Headworks

Fig. 5: Plant for Pakistan 3rd April 2019, Islamabad

Programme Components

Enhancement of Forest Cover: The Phase-I of this component of the Programme focuses on enhancement of the forest cover by adding 3.29 billion indigenous plants through afforestation, reforestation and regeneration over next four years to curb the impacts of climate change. The priority areas for the plantation programme are as under:

a. Conservation and enhancement of natural forests through assisted natural regeneration
b. Road and canal side plantation
c. Rehabilitation and re-stocking of historical plantations
d. Restoration and improvement of scrub forests
e. Increase in existing cover of mangrove forests
f. Watershed and soil conservation in hilly and river catchment areas (reserved as well as community forests)
g. Rehabilitation of guzara and protected forests
h. Protection and augmentation of dry temperate forests

Fig 6.Monsoon Plantation 5th August 2019

Biodiversity Conservation: The challenges to wildlife protection and preservation will be overcome through improvement and effective implementation of wildlife legislations and institutional strengthening as under:

a. Enhanced management of Protected Areas (Biosphere Reserve/ National Parks) with special focus on Eco-tourism (at least one in each province/territory) on international standards.
b. Establishment or Up gradation of existing Zoo on international standards (at least one in each province/territory)
c. Revival of Critically Endangered Habitats (at least one habitat in each province/territory)
d. Improvements of Wildlife related Legislations and its implementation.
e. Curbing of illegal wildlife trafficking through establishment of control desks in international/national airports.
f. Rehabilitation/ Rescue Centers for Confiscated Wildlife in each province/ territory.
g. Zero plastic in protected areas.

h. Liaison between Wildlife Departments and Universities.
i. Rehabilitation of forest covers in Man and the Biosphere (MAB) reserves and intervention for declaration of more MAB reserves, which are in pipeline.

Institutional Strengthening: Zoological Survey of Pakistan (ZSP) is the pioneer research organization for multi-disciplinary zoological and wildlife related matters in the country. Therefore, to enhance its capacity following are the specific objectives.

a. Strengthening and capacity building of ZSP through establishment of its regional offices in each province
b. Establishment of Zoo-Cum Botanical Garden in reserve forest Bani Gala Islamabad
c. Inventory of Endangered Wildlife Species and Habitat across Pakistan

Fig. 7: Standardization of Survey Techniques for Preparation of Red Book

Financing

The Programme will be financed through indigenous resources. An amount of Rs. 125.184 billion, which includes Rs. 109.12 billion for forestry component, Rs. 15.853 billion for Biodiversity / Wildlife Component will be jointly provided by Federal and Provincial

Governments. The Ecosystem Restoration Fund is likely to be created with financing from different donor and multilateral sources.

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3. International Cooperation Wing

International Cooperation Wing of the Ministry of Climate Change has four sections/units which are responsible for performing a range of functions;

1. Chemical section is mandated to set ground for implementation of various chemical and waste related conventions namely; Basel, Stockholm, Minamata, Rotterdam Conventions, etc.
2. National Ozone Unit was established in 1996 under the Montreal Protocol on the Substances that Deplete the Ozone Layer by Pakistan. The main objectives of NOU are to control import of Ozone Depleting Substances and assist the local industry for phasing out the use of ODS through financial and technical support of the Multilateral Fund Secretariat (MLFS).
3. POPs project was established through the funding of Global Environment Fund (GEF) with the aim of reducing human health and environmental risks by enhancing management capacity and disposal of POPs in Pakistan.
4. International Cooperation Section is responsible for coordination with international environmental agencies, signing & implementation of MOUs and handling of matters related to GSP+.

During the year 2018-19 these sections/units performed a number of functions. Detail of the activities and achievements of IC Wing has been enunciated below;

1. CHEMICAL SECTION

a. Minamata Initial Assessment Project:

- A programme was on aired at Radio Pakistan for the awareness on Minamata Convention on mercury in Islamabad.
- Meetings of National Coordination Committee and Sub–committee of MIA Project were conducted on 06th September and 30th August 2018 in Islamabad.
- Awareness Seminar for school and college children on mercury was organized on 05th September 2018 in Islamabad.
- Final Workshop on MIA project was organized on 07th September 2018.

b. Draft Updated National Implementation Plan Report:

- Final workshop on updated National Implementation Plan was conducted from 12-14 February, 2019 in Islamabad. Consequently, reports of NIP project consultants were shared for review and finalization.

2. NATIONAL OZONE UNIT

a. Implementation of Ozone Depleting Substances (ODS) Phase Out Projects:
   - Assessed the HCFC (hydro chlorofluorocarbon) importers warehousing facility and directed them to maintain their warehouses meant for HCFC storage as per the MSDS (Material Safety Data Sheet).
   - In order to phase out the ODSs from the thermo-ware, PU sandwich panel and air conditioning industries, NOU, along with relevant implementing agencies, is implementing HPMP Stage-II. After that, the remaining industries in XPS and Air Conditioning would be phased out and accordingly funding request to MLFS will be submitted under HPMP stage III.
   - Industrial/commercial importers data for HCFCs import was monitored on monthly basis. National Ozone Unit updated the HCFCs importers regarding latest requirements of the ODSs storage and maintenance.

b. Handling of HCFC Quota Related Matters:
   - After meticulous examination of applications, under the principles of Montreal Protocol, quota was issued to the eligible importers of HCFCs on 27th February, 2019.
   - Effective compliance of ODS phase out has been ensured and 10% reduction targets of the HCFC phase out on 1st January 2015 has been met and accordingly indicated in HCFC quota 2019.

c. Awareness Campaigns:

   - Seminar on World Ozone Day (WOD) was organized on the 18th September, 2018 at Grand Ambassador Hotel, Islamabad. Public was briefed about the use of ozone friendly technology.

- Special newspaper supplement was published in different national dailies on International Ozone Day-2018 to create awareness among the general public about the protection of ozone layer.

d. Enforcement of Policy / Regulatory Measures:
    - Illegal imports and trading of HCFCs was controlled in close coordination of Pakistan Customs. As a result one largest seizer of its kind by Pakistan Customs where 18,000 Kilograms of the smuggled refrigerant (R 22) at Karachi port was seized in mid-October,2018.

3. PERSISTENT ORGANIC POLLUTANTS (POPS)

a. Measures for Legislative Development:
    - In order to incorporate POPs related legislative measures, the draft amendments have been suggested in section 31 of Pakistan Environmental Protection Act, 1997 (PEPA). The draft will be shared with relevant ministries and law Division to get it approved from the Parliament of Pakistan.

b. Up-gradation of EPA Laboratories and Inventory for PCBs:
    - Gas Chromatography – Mass Spectrometer has been installed by the Project in Pak EPA Islamabad, EPA Sindh and Punjab. 4 additional GC-MS have been procured to be installed in EPA KPK, Baluchistan, Gilgit Baltistan, and Azad Jammu and Kashmir. The EPAs staff has also been trained to perform POPs samples analysis.

c. Technical Training:
    - Standard training manual on POPs pesticides and PCBs was developed and on-site training of trainers was realized in all the major cities of Pakistan through the co-financing and logistic support from relevant government departments where the trainings were conducted.
    - 13 number of on-site training on best management practices for POPs have been conducted all over Pakistan. Total 610 numbers of participants benefited from these trainings out of which 52 were females

4. INTERNATIONAL COOPERATION SECTION

- IC Section conducted the Consultative meetings, with all the members of Federal Treaty Implementation Cell from, 20th to 24th May, 2019. In these meetings, Pakistan's obligation under GSP Plus was discussed and future prospects were analyzed.

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4. Environment Wing

Unpredictable weather patterns and climate change have emerged as the biggest environmental challenges that are affecting almost all the sectors of the economy particularly water resources, energy, health, biodiversity with a major impact on agricultural productivity. In view of Pakistan's high vulnerability to the adverse impacts of climate change, the current government is committed to meet this challenge and the Prime Minister has constituted "Prime Minister's Committee on Climate Change" to provide high level strategic guidance and platform for coordinated efforts on the issues of climate change.

2. The government has also introduced climate budget coding and expenditure tracking system. This initiative has become a solid conduit for the climate change finance mainstreaming and will foster transparency in public investments. The monitoring of expenditure will also give confidence to the international development partners in tracking expenditure under different funding streams to ensure that the finances are spent on the intended objectives.

3. Various initiatives in the field of Climate Change adaptation and mitigation have been undertaken in accordance with the National Climate Change Policy as enumerated below:

- **a.** To ensure effective implementation of National Climate Change Policy and its Framework, meetings of National Climate Change Policy Implementation Committee have been held.
- **b.** Pakistan Climate Change Council has been constituted and Pakistan Climate Change Authority is being established to address the issues of climate change and meet Pakistan's obligations under international conventions relating to climate change.
- **c.** Pakistan Climate Change Council is high powered body being chaired by the Prime Minister, federal provincial governments, academia; FPCCI etc are its members.

4. Under the Pakistan Climate Change Act, 2017, the council is mandated to: -

- **a.** Co-ordinate and supervise enforcement of the provisions of this Act;
- **b.** Monitor implementation of international agreements relating to climate change specified in the Schedule;

c. Coordinate, supervise and guide mainstreaming of climate change concerns into decision-making by Federal and Provincial Government's ministries, divisions, departments and agencies so as to create enabling conditions for integrated climate-compatible and climate-resilient development processes in various sectors of the economy;

d. Approve and monitor implementation of comprehensive adaptation and mitigation policies, strategies, plans, programmes, projects and other measures formulated by the Authority to meet Pakistan's obligations under international conventions and agreements relating to climate change including in particular the Sustainable Development Goals (SDGs);

e. Monitor implementation of the National Adaptation Plan and its constituent provincial and local adaptation action plans, the National Appropriate Mitigation Action Framework and National Communication submitted to the concerned Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC);

f. Approve guidelines for the protection and conservation of renewable and non-renewable resources, species, habitats; and biodiversity in. general adversely affected or threatened by climate change; and

g. Consider the National Climate Change Report and give appropriate directions thereon.

5. The Government of Pakistan is committed to curb emissions to mitigate and adapt to the harmful effects of climate change. As transportation accounts for 43% of the airborne emissions in the country, the Ministry is in the process of developing the EV Policy with the mandated minimum penetration targets for Electric Vehicles.

Air quality:

6. Air pollution issues in the country and incidents of periodic smog in Punjab and surrounding areas in winter seasons are of concern, as it is causing huge health and financial implications i.e. flights and train service had been cancelled, and public transportation disrupted which had caused delay in routine economic activities. The smog being a air pollution issue had caused health impacts in the shape of throat and eye infections. The phenomenon is caused due to "Smoke" and "Fog". The contributing factors for smog are; i) Automobile exhausts, ii) Power plants and factories, and iii) Crops residue burning etc.

7. However, in Pakistan, around 20,000 brick kilns, mostly located in the peripheries of urban settlements contribute significantly to air pollution and smog in winters. Pakistan's brick sector is highly unregulated and un-coordinated but is sharing approximately1.5% in Pakistan's Gross Domestic Product (GDP). This sector has a significant role in directly employing 1.3 million semi-skilled or unskilled people in Pakistan. Similarly, this sector is also providing indirect employment to many coal workers in Pakistan. Therefore, brick sector is significantly contributing towards the livelihood of millions of people from the poorest strata.

8. Traditional brick production in Pakistan consists of hand-made bricks which are baked in Fixed Chimney Bull's Trench Kilns (FCBTK), the most widely used brick firing technology in Pakistan. However, this way of baking bricks is less efficient and costs dearly to environment. Zig-Zag Technology is more efficient and environment friendly but the cost of conversion ranges from Rs. 3-3.5 million per unit. Ministry of Climate Change has already started working on imparting technical training to convert kilns to Zig-Zag technology through TEVTA and NAVTTC. However, the brick sector is not recognized as a formal sector, therefore financing for such a conversion or installation of new units is formally not available. The financing available through non-formal channels has an exorbitant cost.

9. Being an informal sector, it is largely unregulated and unchecked by different government authorities. Therefore, there are precedents of blatant violations of Environmental as well as Labour Laws. Furthermore, this sector is also out of tax net, thus causing a loss of revenue to the government. Foregoing in view,it is imperative to regularize brick sector for enforcement of all legal frameworks.

10. The Brick Kilns may be provided easy access to financial capital through various public sector financial institutions for conversion into Zig-Zag Technology. Such an access to easy financing may be linked with the formal commitment of brick kilns to the implementation of National Environmental Quality Standards (NEQs). Provincial Environmental Protection Agencies can be the enforcers through their field offices. This will automatically formalize the brick sector.

Pakistan's Second National Communication on Climate Change

11. Pakistan's Second National Communication on Climate Change has been prepared by Ministry of Climate Change, Government of Pakistan, to fulfill the obligatory requirements

under Article 4(1) of UNFCCC. This document has been prepared under the guidance of 'UNFCCC's Guidelines (year 1996) for the preparation of national communications from non-Annex I Parties (revised in year 2002).

12. The Second National Communication SNC contains an update till the year of 2015 about efforts identified and undertaken by Pakistan in different thematic areas related to climate change. It also highlights vulnerabilities of the country and the presents an inventory of the emission sources and sinks. It also encompasses the aspects related to climate change research, technology, capacities/ awareness, besides other areas of climate change communications.

13. The content of the document is outcome of rigorous consultations and expert input by six Technical Working Groups, i. e., i) Greenhouse Gas Inventory, ii) Vulnerability & Adaptation Assessment, iii) Mitigation Analysis, iv) Environmentally Sound Technologies, v) Research & Systematic Observations and vi) Climate Change Education, Training, Information Sharing & Networking and Public Awareness, etc. The information has been extensively reviewed, consulted, compiled and presented.

14. The preparation of the SNC is also enhanced general awareness and knowledge on climate change-related issues in Pakistan. It should seek to assist in the process of national planning and policy formulation, especially as it relates to mainstreaming vulnerability, and adaptation and mitigation measures within the work programme of the various stakeholder agencies. In addition, it contributed to the social and economic development of the country by reducing vulnerability associated with climate change, or proposing options to do so in the sectors mentioned above.

15. The report reveals that the projected increase in temperature over Pakistan by the end of 21st century would be around 1 degree Celsius higher than the expected global average. This means that Pakistan is amongst the most vulnerable countries of the world and climate change would further increase the risks which we are projected to face.

16. The National Communication on Climate Change also presents that Pakistan is not significantly responsible for causing climate change, as its emissions stand at 406 million tones which is less than one percent of the global emissions. Besides, this situation and being a responsible nation, Pakistan has committed to reduce 20 percent of its projected emission for the year 2030, subject to provision of committed global support of this cause. Pakistan would

also be playing a stronger role in global climate change negotiations -to be held in Madrid, Spain at year 2019.

Conference of Parties (COP-24)

17. The 2018 United Nations Climate Change Conference was the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change, also known as the Katowice Climate Change Conference. It was held between 2 and 15 December 2018 in Katowice, Poland. Pakistan delegation at Conference of Parties (COP-24) was led by Malik Amin Aslam, Advisor to Prime Minister on Climate Change successfully secured 05 positions for various committees under United Nations Framework Convention on Climate Change (UNFCCC) showing trust on Pakistan's commitment to climate negotiations.

3rd Forum of Ministers & Environment Authorities of Asia Pacific 23-25 Jan,2019 Singapore

18. The Ministry participated in the 3rd Forum of Ministers and Environment Authorities of Asia Pacific from 23-25 January 2019. It was jointly organized by the Singapore's Ministry of the Environment and Water Resources and the United Nations Environment Programme in Singapore. The Forum focused on the theme of the fourth session of the United Nations Environment Assembly, 'Innovative Solutions for Environmental Challenges and Sustainable Consumption and Production'. The Forum was attended by the following countries served by the United Nations Environment Programme Regional Office for Asia and the Pacific: Afghanistan, Australia, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, India, Indonesia, Iran (Islamic Republic of), Japan, Kiribati, Korea (Democratic People's Republic of), Korea (the Republic of), Lao PDR, Malaysia, Maldives, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, New Zealand, Niue, Pakistan, Palau, Philippines, Samoa, Singapore, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Viet Nam. Participants included 30 Ministers, along with other High-Level Representatives of Governments, intergovernmental organizations, United Nations organizations, and representatives of civil society groups and partners.

19. The third session of United Nations Environment Programme's Forum of Ministers and Environment Authorities of Asia Pacific comprised of a Senior Officials Segment and a Ministerial segment. The objectives of the Forum were to discuss:

a. Progress in the region in implementing resolutions and decisions of the United Nations Environment Assembly of the United Nations Environment Programme; and identification of regional priorities for the fourth session of the United Nations Environment Assembly.

b. 'Innovative Solutions for Environmental Challenges and Sustainable Consumption and Production', from an Asia and the Pacific perspective.

20. Under agenda item 5 (b) on the Election of Officers, the Forum elected the following Bureau members:

a. Chair: H.E. Mr. Masagos Zulkifli, Minister of the Environment and Water Resources, Singapore

b. Vice-Chair: H.E. Mr. Fleming Sengebau, Minister, Ministry of Natural Resources, Environment, and Tourism, Palau.

c. Vice-Chair: H.E. Mr. Malik Amin Aslam Khan, Advisor to the Prime Minister on Climate Change, Pakistan.

United Nations Environment Assembly (UNEA-4)

21. Ministry of Climate Change participated in the Fourth Session of United Nations Environment Assembly (UNEA-4) took place from 11-15 March 2019 in Nairobi, Kenya. The theme of UNEA-4 was "Innovative solutions for environmental challenges and sustainable consumption and production." The assembly was attended by five Heads of State and Government, 157 ministers and deputy ministers, and about 5,000 participants from 179 countries. The Assembly included plenary sessions, leadership dialogues and One Planet Summit convened by the presidents of France and Kenya.

HIGH-LEVEL SEGMENT: **National statement of Pakistan:**

22. The national statement of Pakistan was delivered by Malik Amin Aslam Khan, Advisor to Prime Minister on Climate Change. The statement highlighted government's flagship initiates of "Clean and Green Pakistan" as well as the "Billion Tree Tsunami" in Khyber Pakhtunkhwa that had resulted in 4% increase in forest cover, creation of green jobs for local community and participation of the youth to become custodians of green future. The

current plan to plant Ten Billion Trees and "Re-Charge Pakistan" to restore wetland eco-systems as well as recharge groundwater was also explained.

23. A comprehensive account of environmental consequences of the India's aerial intrusion into Pakistan on 26 February 2019 was provided. A protected forest reserve of global significance, registered under Bonn Challenge, was destroyed due to unprovoked aggression. It was a strike against nature. It was emphasized that there was urgent need to strengthen international laws and commitments of the global community to take cognizance of such offences against nature. Pakistan intended to take up the matter at the UN Sixth Committee. It was categorically stated that a person authorizing such a strike was not a champion of the Earth but belonged to the Earth's hall of shame. Complete national statement and video clip can be viewed at http://web.unep.org/environmentassembly/statements.The representative of India exercised it's right to response and rebutted the contents of the statement related to aerial strike on Pakistan. The Pakistan High Commission also exercised it's right to respond and stated that Pakistan has exposed the darker side of the conflict that had detrimental effect on the environment.The Pakistani Delegation also handed over demarche on the incident to the Acting Executive Director of UNEP, Deputy Representative of UN, President of IUCN and representative of WWF.

24. Besides, numerous bilateral meetings were held by the Pakistani Delegation on the sideline of the conference as per following:-

a. Acting Executive Director, UNEP:

Ms. Joyce Msuya was informed about ongoing initiatives of the Government of Pakistan to overcome environmental challenges. Ms. Joyce appreciated that achievement of Pakistan to plant One Billion Trees in the province of Khyber Pakhtunkhwa province reckoned it as a global project of significant importance. The long standing demand of Pakistan to establish country office of UNEP in Islamabad was reiterated. Ms. Joyce informed that initial spadework to open UNEP office in Pakistan has been completed and soon it shall be made operational. The loss to forest resource caused by the Indian Air strike was explained in detail and support was sought to prepare international laws for 'Eco Terrorism'.

b. Minister for Environment of Kenya:

H.E. Mr. Kcriako Tobiko was informed by the Advisor on the implementation of Billion Tree Tsunami Project in Khyber Pakhtunkhwa, the ongoing initiative to plant Ten Billion Trees across Pakistan, the Clean and Green Pakistan and the Recharge Pakistan Programme. The Tobiko explained about the success of the ban on the use of plastic bags across Kenya. A law was enacted to ban use of plastic bags and the government stopped all manufacturers from producing plastic bags. As per law, producing or using plastic bags can be fined up to Kenyan Shilling 02.00 million which is equal to US$20,000/-. If anyone is found using or selling plastic bags in a market place, the authorities can shutdown entire market place until there is a full compliance. There is now a new industry of bio-degradable or perishable bags coming up in the country. The Minister boasted of nearly 100% success in banning plastic bags. Advisor expressed interest in seeking Kenya's assistance for a similar initiative in Pakistan.

Minister Tobiko deeply appreciated Pakistan's success in Billion Tree Tsunami project. He stated that forest cover in Kenya was now at 7.2% after falling to 6.9%. The target was to achieve minimum of l0% forest cover by 2022. To achieve that, they had to plant 500 million trees per year. Minister Tobiko sought assistance from Pakistan in that regard. The meeting concluded with the understanding that two sides will work out ways and means to (i) assist Kenya in its plantation efforts and (ii) Pakistan in its efforts to ban plastic bags in the country.

c. Environment Minister of South Korea:

H.E. Mr. Park Chun Kyoo informed that the Ms. Joyce Msuya was informed about ongoing initiatives of the Government of Pakistan to overcome environmental challenges. Ms. Joyce appreciated that achievement of Pakistan to plant One Billion Trees in the province of Khyber Pakhtunkhwa province reckoned it as a global project of significant importance. The long standing demand of Pakistan to establish country office of UNEP in Islamabad was reiterated. Ms. Joyce informed that initial spadework to open UNEP office in Pakistan has been completed and soon it shall be made

operational. The loss to forest resource caused by the Indian Air strike was explained in detail and support was sought to prepare international laws for 'Eco Terrorism'

25. Advisor's presence at the UNEA-4 and his aforementioned engagements during the course of the Assembly helped project positive impression of Pakistan on the Climate Change front. The Billion Tree Tsunami project in KPK and the 10 Billion tree Tsunami project currently underway across Pakistan were an eye opener for many. Sharing information on other initiatives like "Recharge Pakistan" and "Clean and Green Pakistan" also received deep appreciation.

Leadership Dialogues:

27. The Advisor was a Panelist in one of the Leadership Dialogues on "Sustainable Finance for Climate Impact" in which it was, inter-alia, explained how green economy was supported in Khyber Pakhtunkhwa under Billion Tree Tsunami project as a result of tangible and viable interventions devised by the government. Several participants from the floor requested to design climate finance mechanisms that are simpler to use and monitor.

Ministerial Declaration:

28. In the UNEA-4 Ministerial Declaration, the Ministers of Environment express dedication to address environmental challenges through advancing innovative solutions and to move towards sustainable and resilient societies through Sustainable Consumption and Production. It was reiterated that for effective implementation of these actions enabling and coherent policy frameworks, good governance and law enforcement at all levels and effective means of implementation is required. The declaration emphasizes the need for concerted efforts towards achieving the 2020 goals for the sound management of chemicals and an enabling framework for international sound management of chemicals and waste beyond 2020 for possible consideration at UNEA-5.

GLOBAL GREEN GROWTH INSTITUTE (GGGI)

29. Ministry of Climate change is in a process of finalizing the MOU with Global Green Growth Institute (GGGI) South Korea. The Global Green Growth Institute (GGGI) is a treaty-based international organization which aims to promote green growth, paradigm characterized

by a balance of economic growth and environmental sustainability. The institute would provide support for green economic growth, that simultaneously addressed poverty reduction, job creation, social inclusion, and environmental sustainability and works across four priority areas considered to be essential to transforming national economies, including energy, water, land-use, and green cities.

30. Founded to support green economic growth that simultaneously addresses poverty reduction, job creation, social inclusion, and environmental sustainability, GGGI works across four priority areas that are considered to be essential to transforming national economies, including energy, water, land use, and green cities.

31. GGGI envisions a resilient world achieved through strong, inclusive, and sustainable green growth, and is dedicated to supporting the transition of GGGI Member countries toward a green growth model. In pursuit of these goals, GGGI works with developing and emerging countries to design and deliver programs to demonstrate new pathways for pro-poor, sustainable economic growth.

32. GGGI supports stakeholders through the delivery of comprehensive products and services designed to assist in developing, financing, and mainstreaming green growth to support the implementation of national economic development priorities and international commitments.

South Asia Cooperative Environment Programme (SACEP) Governing Council:

33. South Asia Co-operative Environment Programme (SACEP) is an inter-governmental organization, established in 1982 by the governments of South Asia to promote and support protection, management and enhancement of the environment in the region. SACEP member countries are Afghanistan , Bangladesh , Bhutan , India , Maldives , Nepal , Pakistan and Sri Lanka. The Fourteenth meeting of the Governing Council (14GC-SACEP) was held on 26 - 28 March 2018, Hosted by Government of the Islamic Republic of Afghanistan, held in Colombo, Sri lanka. The Ministry participated in the Governing Council meeting. Government of Pakistan granted US$100,000.00 contribution for the construction of the SACEP secretariat in Colombo.

POLICY INPUTS AND INITIATIVES TAKEN REGARDING UN-HABITAT

34. UN-Habitat is the United Nations programme working towards a better urban future. Its mission is to promote socially and environmentally sustainable human settlements development and the achievement of adequate shelter for all. Pakistan is founding member of UN-Habitat and contributes US$ 6000 yearly to the Core Budget of UN-Habitat.

35. Cities are facing unprecedented demographic, environmental, economic, social and spatial challenges. There has been a phenomenal shift towards urbanization, with 6 out of every 10 people in the world expected to reside in urban areas by 2030. Over 90 per cent of this growth will take place in Africa, Asia, Latin America, and the Caribbean. In the absence of effective urban planning, the consequences of this rapid urbanization will be dramatic.

36. In many places around the world, the effects can already be felt: lack of proper housing and growth of slums, inadequate and out-dated infrastructure – be it roads, public transport, water, sanitation, or electricity – escalating poverty and unemployment, safety and crime problems, pollution and health issues, as well as poorly managed natural or man-made disasters and other catastrophes due to the effects of climate change. Mindsets, policies, and approaches towards urbanization need to change in order for the growth of cities and urban areas to be turned into opportunities that will leave nobody behind. UN-Habitat, the United Nations programme for human settlements, is at the helm of that change, assuming a natural leadership and catalytic role in urban matters.

37. In October 2016, at the UN Conference on Housing and Sustainable Urban Development – Habitat III – member states signed the New Urban Agenda. This is an action-oriented document which sets global standards of achievement in sustainable urban development, rethinking the way we build, manage, and live in cities. Through drawing together cooperation with committed partners, relevant stakeholders, and urban actors, including at all levels of government as well as the private sector, UN-Habitat is applying its technical expertise, normative work and capacity development to implement the New Urban Agenda and Sustainable Development Goal 11 – to make cities inclusive, safe, resilient and sustainable.

38. Mandated by the UN General Assembly in 1978 to address the issues of urban growth, it is a knowledgeable institution on urban development processes, and understands the

aspirations of cities and their residents. For forty years, UN-Habitat has been working in human settlements throughout the world, focusing on building a brighter future for villages, towns, and cities of all sizes. Because of these four decades of extensive experience, from the highest levels of policy to a range of specific technical issues, UN-Habitat has gained a unique and a universally acknowledged expertise in all things urban.

39. This has placed UN-Habitat in the best position to provide answers and achievable solutions to the current challenges faced by our cities. UN-Habitat is capitalizing on its experience and position to work with partners in order to formulate the urban vision of tomorrow. It works to ensure that cities become inclusive and affordable drivers of economic growth and social development.

40. Future growth trends of cities in Pakistan; will focus on meeting the new challenges in governance and urban service delivery; besides, removing the social inequity; minimizing the ecological damage, environmental degradation and energy crises. With the Government of Pakistan's adoption of the New Urban Agenda, it is proactively urging the Provincial Governments and other stakeholders to work together to implement the Sustainable Development Goals, including: the Goal 11, that calls for making cities and human settlements inclusive, safe and resilient; as well as the Action Plan of Quito Declaration.

41. There is also an urgent need to raise awareness and work towards the effective planning and management of fast urbanizing Pakistan. For this purpose, the Urban Policy will accompany a Communication Strategy, to be launched by the partners both from the donor community, public & private sectors and citizens' participation.

42. In Pakistan cities, the slums/Katchi Abadis dwellers suffer from access to inadequate basic services and opportunities to earning new or improved income. Government of Pakistan is committed to assist the Provincial Governments in improving the living conditions in the slums and ensuring its healthy residents are able to effectively contribute to the economies of the cities they live in. Prime Minister announced 5 Million Housing Program which provides an excellent opportunity to meet housing backlog as well as trigger sustainable urban growth and regional socio-economic development in the country.

THE STATE OF PAKISTANI CITIES REPORT

43. The State of Pakistani Cities report is spearheaded by the Ministry of Climate change with the technical assistance of the United Nations Human Settlements Program (UN Habitat) funded by the Australian Government. The State of Pakistani Cities (SPC) report is a pivotal document published in 2018, 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 ten selected cities make up more than half of the total urban population, accounting for 54 percent of the national urban population.

44. The responsibility for the management of Pakistani cites is divided between Municipalities, District Administration, Development Authorities and Service Delivery Institutions for example, the responsibility for Urban Planning rests with City Development Authorities, while public land ownership is fragmented and divided between Municipality, Development Authorities, Cantonments, Industrial Estates, and Provincial Government departments. The delivery of basic urban services is similarly divided amongst separate authorities. Each agency is autonomous in carrying out the development works and maintaining the facilities within their jurisdiction. However, they all rely on provincial or national bodies for funds. Since provincial authorities collect local revenues no efforts are put into strengthening the social and financial or capacity or managerial capability of local bodies.

The Habitat Country Programme, Pakistan 2018-2022

45. The Habitat Country Programme, Pakistan 2018-2022 has been formulated by the UN-Habitat, to address the urban issues in Pakistan. The same has been endorsed by the Ministry of Climate Change, as it is addressing the urban issues and climatic impacts due to urbanization and identification of strategies to address the issues in a robust way.

46. The HCP has been designed in line with overarching mandate of UN Habitat, aligning its normative and operational activities at the country level. The programme also takes into consideration the Pakistan's Vision 2025, New Urban Agenda, SDG 11 and other crosscutting SDG's. Further, lessons learnt from UN-Habitat in-country initiatives in the recent past are key analytical inputs of the HCP Pakistan.

47. The following seven focus areas of UN-Habitat Strategic Plan 2014-2019 have been adopted in formulation of HCP Pakistan 2018-2022.

i. Urban policies, legislation, land and governance
ii. Urban planning and design
iii. Urban economy
iv. Urban basic services
v. Housing and slum upgrading
vi. Risk reduction and rehabilitation
vii. Research and capacity development

Enhance Community, local and national level urban climate change resilience to water scarcity, caused by floods and droughts in Rawalpindi and Nowshehra

UN-Habitat Pakistan with support of Ministry of Climate Change submitted the project titled **'Enhance Community, local and national level urban climate change resilience to water scarcity, caused by floods and droughts in Rawalpindi and Nowshehra'** to Adaptation Fund Board, which has been recently approved by Adaptation Fund Board. The project financing support of the Adaptation Fund Board is US$ 6 millions.

48. The project objectives and targets are well aligned with the National Climate Change Policy as well as new National Water Policy (2018) and National Flood Protection Plan (2016). The main objective of the proposed project is to enhance community, local and national-level urban climate change resilience to water scarcity, caused by floods and droughts in Rawalpindi and Nowshera. This will be achieved through the following sub-objectives:

Community level:

1. Enhance community- and household-level flood resilient water harvesting facilities (using innovative techniques) and strengthen capacities to plan, construct, operate, maintain and duplicate these.

District / City level:

2. Enhance city and district-level water harvesting facilities in public buildings and on water storages in public gardens, develop district / city-level spatial strategies as tool to assess climate change related floods, droughts and water scarcity to plan for and manage climate change risks and to strengthen capacities to plan, construct, operate, maintain and duplicate water harvesting facilities in public buildings and gardens..

National level:

3. Strengthen national-level capacity to guide / direct city-level development considering climate change and disaster risks and impacts, especially water scarcity caused by floods and droughts.

WASH strategic unit

49. PC- I of WASH strategic unit was approved and allocation of 16 Million has been made under the PC-1. The staff hiring has been initiated.

50. National Joint Sector Review of WASH sector was organized on 17-18th December, 2018. As an outcome, Ministry of Climate Change facilitated the provincial governments in establishing the base line and targets for water, sanitation and hygiene and its consolidation at national level. The baselines and targets are also endorsed by the provincial governments and shared with MoPDR.

Overall Summary of SDG Baseline and Targets for 6.1 and 6.2

Regions/ Provinces	Baseline			Targets 2030		
	Safe Water-%	Safe Sanitation-%	Annual Allocation Rs. Bill.	Safe Water -%	Safe Sanitation %	Annual Required Rs Bill
Balochistan	19	0	20	100	100	35
KP	52	0	20	100	47	40
Punjab	35	0	70	100	100	221
Sindh	19	0	40	82.5	64	80
Pakistan	36	0	150	95	72	376

51. GLAAS Survey Report for SDG 6a and 6b was compiled with the support of respective stakeholders (Ministry of Education, Ministry of Health , PCRWR, Pakistan Bureau of

Statistics and development sector partners UNICEF, WHO). The report was finalized and submitted to WHO. The 5th GLAAS Survey 2018-2019 has been published.

Clean Green Pakistan Movement

52. Clean Green Pakistan Movement was conceptualized and launched by Prime Minister on 13th October, 2018. The focal departments and entities of CGPM were notified.

- Clean Green Pakistan was conceptualized to raise environmental awareness while promoting a nation that is prepared to handle the responsibilities of accomplishing our goals. The CGP movement consists of five pillars while building on behavioral change and institutional strengthening. The five pillars include Plantation, Solid Waste Management, Liquid Waste/Hygiene, Total Sanitation, and Safe Water. Over the course of recent months the Ministry of Climate Change has worked diligently at the federal and state level to promote and create a powerful people led movement.

53. After the launch of CGPM and road map for CGPM was developed. The CGPM road map encompass nine core pillars and currently WASH Unit is working on the CGPM road map.

- Creating an enabling environment by developing an effective legislative
- Developing and launching a national Clean Green Ambassadors/ Volunteer Program
- Strengthening and making the public infrastructure accessible and inclusive
- Engage, develop, and implement an effective municipal, solid and industrial waste management
- Enhance service delivery through effective engagement of champions, local elected representatives and community groups
- Design, implement, and monitor an effective behavioral change
- Capacitate the key service providers for effective implementation of CGP
- Making inclusiveness and equity an integral component
- Develop an effective monitoring and reporting system

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5. Forestry Wing

STATUS OF FORESTS AND ACTIVITIES CARRIED OUT BY FORESTRY WING

The country is maintaining 4.34 million ha (5.01%) area under forest cover, out of which 3.44 million ha forests exist on state-owned lands and remaining on communal and private lands. To meet the domestic needs and maintain the existing forest strands together with meeting need of improving the forest cover, forestry wing takes policy measures as well as coordination function. In addition to tap international assistance, bilateral and multilateral agreements are facilitated in forestry sector. As land resources, biodiversity and wildlife species are integral part of the forests, the Forestry wing is also responsible for compliance to various MEAs (**Annex I**). Precise functions mandated to the Forestry Wing include:

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

Routine activities in the scope of Forestry Wing in relation with domestic and international obligations/ agreements are presented at **Annex II.**

THE MAJOR ACHIEVEMENTS OF FORESTRY WING DURING 2018-19

i. Up scaling of Green Pakistan Programme into Ten Billion Tree Tsunami Project (TBTTP)
ii. Federal Forestry Board was reactivated to increase interprovincial coordination for restoration and conservation of forestry resources in the country.
iii. A nationwide "Plant for Pakistan Day" campaign was organized on 2nd September, 2018 to create awareness and ensure involvement of general public in increasing tree cover. Overall, 192 events were organized throughout the country.
iv. Prime Minister of Pakistan inaugurated the "Ten Billion Tree Tsunami Programme" on 2nd September, 2018 to plant 3.2 billion plants in the country during the first phase.
v. Replication of successful Billion Tree Tsunami Project in Khyber Pakhtunkhwa Government has been started all over the country.

vi. MoU was finalized with China to increase cooperation in the field of forestry between the People's Republic of China and Government of Pakistan. The MoU will most likely be signed during forthcoming visit of Prime Minister of Pakistan to China.

vii. An exclusive consultative session was held with Parliamentarians to discuss the National REDD+ Strategy.

viii. MoU between Ministry of Climate Change and Ministry of Energy (Power Division) to establish plantation on Ghazi Barotha Hydropower Spoil Banks.

ix. MoU between Ministry of Climate Change and Ministry of Communications for the implementation of project titled "Apni Shahrah" to establish plantation in the Right of Way of National Highways and Motorways

Measures to Increase Forest Cover

i. 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 mainstreaming notions of adaptation and mitigation through ecologically targeted initiatives covering afforestation, biodiversity conservation and enabling policy environment.

The activities were undertaken in **100 districts** spread all over Pakistan. The progress of "Plantation and distribution of plants during "Plant for Pakistan Day" on 2nd September 2018" and March 2019, and other national planting targets and achievements are presented at **Annex III.**

ii. Ten Billion Tree Tsunami Project (TBTT)

Government of Khyber Pakhtunkhwa implemented Billion Tree Tsunami Afforestation Project (BTTAP) and the incumbent federal government has launched Ten Billion Tree Tsunami Project by replicating the BTTAP model. The project aims at, inter alia, combating the effects of global warming. This is an umbrella project covering all the provinces including AJK and GB with provincial budgetary share.

Billion Tree Tsunami Afforestation (BTTA) programme is being implemented in Khyber Pakhtunkhwa province with the full involvement of local community, civil society organizations and line public sector departments. Similarly, the Ten Billion Tree Tsunami Project (TBTTP) also adopted a widespread participatory afforestation approach through provincial and federating forestry departments across the country. All segments of society such as students, youth, and farmers are strongly involved in the afforestation activities.

iii. Seasonal Tree Planting Campaigns

In order to enhance tree cover in the country, seasonal tree planting campaigns are held each year. During the reported 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. Data is presented at **Annex III.**

iv. 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.

v. 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 stocked in forests 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 elements required to complete the REDD+ readiness phase. Final documents have been prepared by the

consultants and the project has shared them with the respective provincial forest Departments and the territories for acceptance/concurrence in February, 2019.

Meanwhile, in 2018, an additional grant of USD 4.01 million has also been awarded by FCPF to further support the preparedness activities in Pakistan till June, 2020.

Recent update on REDD+ is at **Annex IV.**

National Biodiversity Strategy and Action Plan (NBSAP)

National Biodiversity Strategy and Action Plan (NBSAP) was prepared, submitted and approved by the Prime Minister of Pakistan in November, 2018. The action plan is widely disseminated and is under implementation with the provinces.

Preparation of Sixth National Reports

The Government of Pakistan is firmly committed to take necessary steps in fulfilling its obligations on the issues related to Conservation of Biological Diversity. All National Reports including sixth National Report to the Convention on Biological Diversity (CBD) were prepared and submitted to CBD Secretariat to fulfill Pakistan's obligation as a Party to the CBD. Sixth National Report to Secretariat of Convention on Biological Diversity can be accessed at https://www.cbd.int/doc/nr/nr-06/pk-nr-06-en.pdf

The consultation process revealed that Pakistan's efforts towards implementation of the global biodiversity targets remained effective in terms of provision of domestic financial resources, biodiversity mainstreaming and related areas. Relatively slow progress was observed in sectors like protected areas coverage and species conservation. Some wild ungulate species have witnessed a steady improvement. So is the case of large carnivores and endemic blind Indus dolphin. Conversely some other species like pangolin and species of least concern have experienced pressure due to natural and anthropogenic factors.

Access to Genetic Resources and Benefit Sharing (ABS) Law

Access and Benefit Sharing (ABS) Law is in process of consultation from provinces and other stakeholders for the approval. Consultative meetings on ABS with stakeholders were organized and a national meeting for the implementation modalities of Nagoya Protocol on Access and

Benefit Sharing was held on October 2, 2018. As an interim arrangement, the provincial representatives allowed exchange of genetic material for research and academic purposes.

Declaration of Marine Protected Areas

As Astola Island declared as first marine protected area of the Pakistan, other potential sites like Churna Island and Miani Horr are in process to be declared as Marine Protected Area.

Plant Conservation Strategy

The meeting on Plant conservation strategy in Pakistan was held at Seminar Room of Faculty of Biological Sciences at Quaid-e-Azam University, Islamabad (QAU) on June 25, 2019 and was jointly arranged by the Ministry of Climate Change (MoCC) and QAU. Objective of the meeting was to initiate a dialogue with the experts related to subject.

International Day of Biodiversity

The International Day for Biological Diversity was observed on 22nd May 2019 by biodiversity Directorate of Ministry of Climate Change in collaboration of IUCN-Pakistan for raising the conservation of biological diversity awareness and this year theme of IDB was our health and our food.

Annex I:

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)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Global Forest Resources Assessment (FRA) of FAO
- FAO Committee on Forestry (COFO)
- UN-REDD+ Programme
- Forest Carbon Partnership Facility (FCPF)
- Asia-Pacific Forestry Commission
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- Coordination with international NGOs in joint programs
- Economic Cooperation Organization (ECO)

Annex II:

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
- Revival of forestry and wildlife resources in Pakistan (GPP).

ACTIVITIES RELATED TO INTERNATIONAL AGREEMENTS

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.

- Implementation of Federal Forest Policy 2015.
- Mangrove for the Future (MFF) regional programme in collaboration with IUCN-Pakistan.
- Implementation of World Bank funded REDD+ Readiness Preparation Proposal (R-PP).
- Preparation and implementation of National Biodiversity Strategy & Action Plan (NBSAP).
- Sustainable Forest Management Project
- 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.
- Preparation and submission of periodic National Reports to conventions
- Sustainable Land Management Programme to combat desertification in Pakistan (SLMP II)

Annex III:

As per agreed targets for **Plant for Pakistan Day**, the total number of plants planted, sown and regenerated in plantations and enclosures on this occasion of 2nd September, 2018 and March, 2019 is **33.065 million** plants.

During the tree planting campaigns, all the government departments, private sector organizations, defense organizations and NGOs were involved in planting activities. During

2018-19 inter-provincial meetings on the onset of Monsoon 2018 and Spring 2019 were held whereby achievement against targets fixed for tree planting are as follows:

(*Plants in Millions*)

Season	Target	Achievement	Survival Rate
Monsoon 2018	47.44	55.195	78%
Spring 2019	141.72	104	85%

Annex IV:

The main achievements of REDD+ Project from July 2018-June 2019 are as under:

- The national REDD+ arrangements have been institutionalized with the recommendation by Management Services Wing of the Economic Affairs Division that the roles of National REDD+ Office should be made part of mitigation wing of the Pakistan Climate Change Authority which has been established at the federal level pursuant to promulgation of Pakistan Climate Change Act 2017.
- The consultancy reports including study on Feedback Grievance Redressal Mechanism and Safeguards Information System, Payment for Ecosystem Services, Awareness & Outreach Campaign initiated under the original grant have been completed.
- The engagement with multiple REDD+ stakeholders continued during the reporting period through consultative workshops, coordination meetings with the provincial focal points, and exposure visits of provincial stakeholders and mainstream journalists to Billion Tree Afforestation Project.
- Two World Bank missions led by Task Team Leader have visited Pakistan to review the country progress in implementing REDD+ Readiness activities. The first mission visited Pakistan on 24th September, 2018 and discussed the causes of delay in signing the grant agreement of additional funding of 4.014 million USD secured by Pakistan in January 2018. A strategy was prepared with support of WB mission to enhance the pace of implementation of additional funding activities.
- A strategic Communication Plan was prepared for a period from 2019-2020
- A short documentary video highlighting Pakistan's status and commitment to reduce emissions from deforestation and forest degradation.
- REDD+ Training Manual for forest communities prepared.

- The designed NFMS web-portal for Pakistan has been finalized and endorsed. Hosting of NFMS web portal is proposed to be done by GCISC. The soft launch of NFMS and Safeguards Information System Web-portal was held on 20-06-2019.
- Terms of References finalized and Expression of Interests processed for hiring of consultant services for implementation of following additional funding assignments:
    - Comprehensive National Level Assessment of Demand and Supply of Forest Products and Services in Pakistan
    - Assessment of private sector engagement and potential of carbon trading mechanisms and market for Pakistan
    - Preparation of Participatory Forest Management Plans and REDD+ Action
    - Assessment of existing Forestry Systems
    - Assessment of opportunity cost of REDD+ and impact assessment of leasing of forest land to other purposes
    - Prepare a REDD+ Gender Action Plan (GAP)

***

ATTACHED DEPARTMENTS AND AUTONOMOUS BODIES

i. Pakistan Environmental Protection Agency (PAK-EPA)

Pakistan Environmental Protection Agency (Pak-EPA) is a statutory body that was created under the Pakistan Environmental Protection Act 1997. It is responsible for the protection, conservation and rehabilitation of Islamabad Capital Territory (ICT)'s environment of in a manner that promotes sustainable development. While remaining mindful of the challenges of environmental compliance, Pak-EPA has strived to bring improvement in Islamabad's environment through monitoring and regulatory activities in the field of:

- air quality control
- water quality control
- hospital waste management
- environmental approval of projects
- environmental licensing
- environmental monitoring, analysis and assessment

In order to efficiently carry out its mandated duties, Pak-EPA is organized into the following:

1) Directorate of Laboratory/National Environmental Quality Standards (Lab/NEQS)
2) Directorate of Administration/Legal/Enforcement (Admn/Legal)
3) Directorate of Environmental Impact Assessment/Monitoring (EIA/Monitoring)
4) Central Laboratory for Environmental Analysis and Networking (CLEAN)
5) National Biosafety Centre

During 2018-19, the following major activities were undertaken by different directorates and wings of Pak-EPA:

1. Air Quality Monitoring & Control

Healthy quality of ambient air is vital for the health and wellbeing of residents of any area. However, in areas of high population density, air pollution has become an environmental health hazard, the sources of which are both man-made and natural. Emissions from transport vehicles, brick kilns, industries, power plants, and burning of solid-waste are major causes of human-induced air pollution. Natural causes of air pollution in Islamabad include natural forest

fires that are common but sporadic in Margalla Hills during summer season, and methane-gas emissions from decaying organic matter.

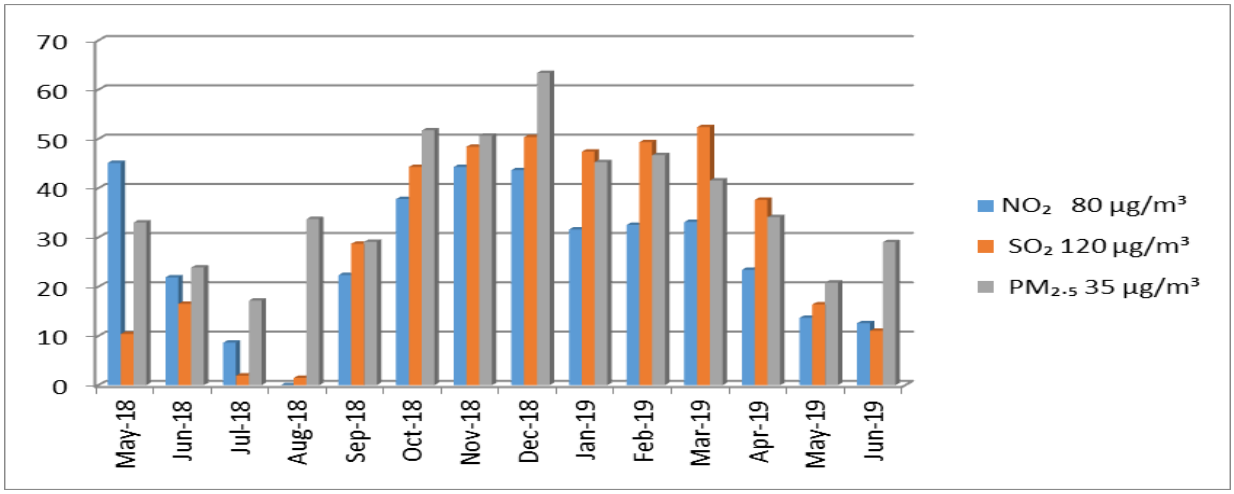
A. Air Quality Monitoring

Air quality monitoring is the first and foremost step in regulating air quality and preventing air pollution. For this matter, Pak-EPA has established an active and reliable monitoring system to routinely monitor important parameters of air quality and urban pollution that are defined in the National Environmental Quality Standards (NEQS). Through its fixed monitoring station located in H-8, Islamabad, Pak-EPA measures the following air pollutants in ambient air: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), carbon dioxide (CO_2) and particulate matter ($PM_{2.5}$ and PM_{10}), which are air pollutants smaller than 2.5 and 10 micrometers, respectively . The main sources of SO2 are power plants. Nitrogen dioxide comes from the burning of fossil fuels (like gasoline). The main sources of NO2 are cars, trucks, particulates matters $PM_{2.5}$ and PM_{10} of coal/dust, combustion, dust, pollen and organic matters. Data on these is gathered and analysed on 24-hourly basis and disseminated to the public through Pak-EPA website (wwww.environment.gov.pk) and official social media accounts.

Monitoring of Ambient Air Quality measures the quality of surrounding air in a particular place.

Monitoring of Emissions involves monitoring of air that is emitted from a particular source (e.g. industries, vehicles, combustion, and brick kilns)

Monthly Average of Main Air Quality Parameters (May 2018 - June 2019):



Pak-EPA also monitors emissions from major industries in Islamabad. This data is gathered in the form of monthly reports that industries submit to Pak-EPA at the end of each month. Pak-EPA also monitors visible emissions from steel furnaces through real-time CCTV monitoring of stacks/chimneys which can be accessed from Pak-EPA's Data Surveillance Room.

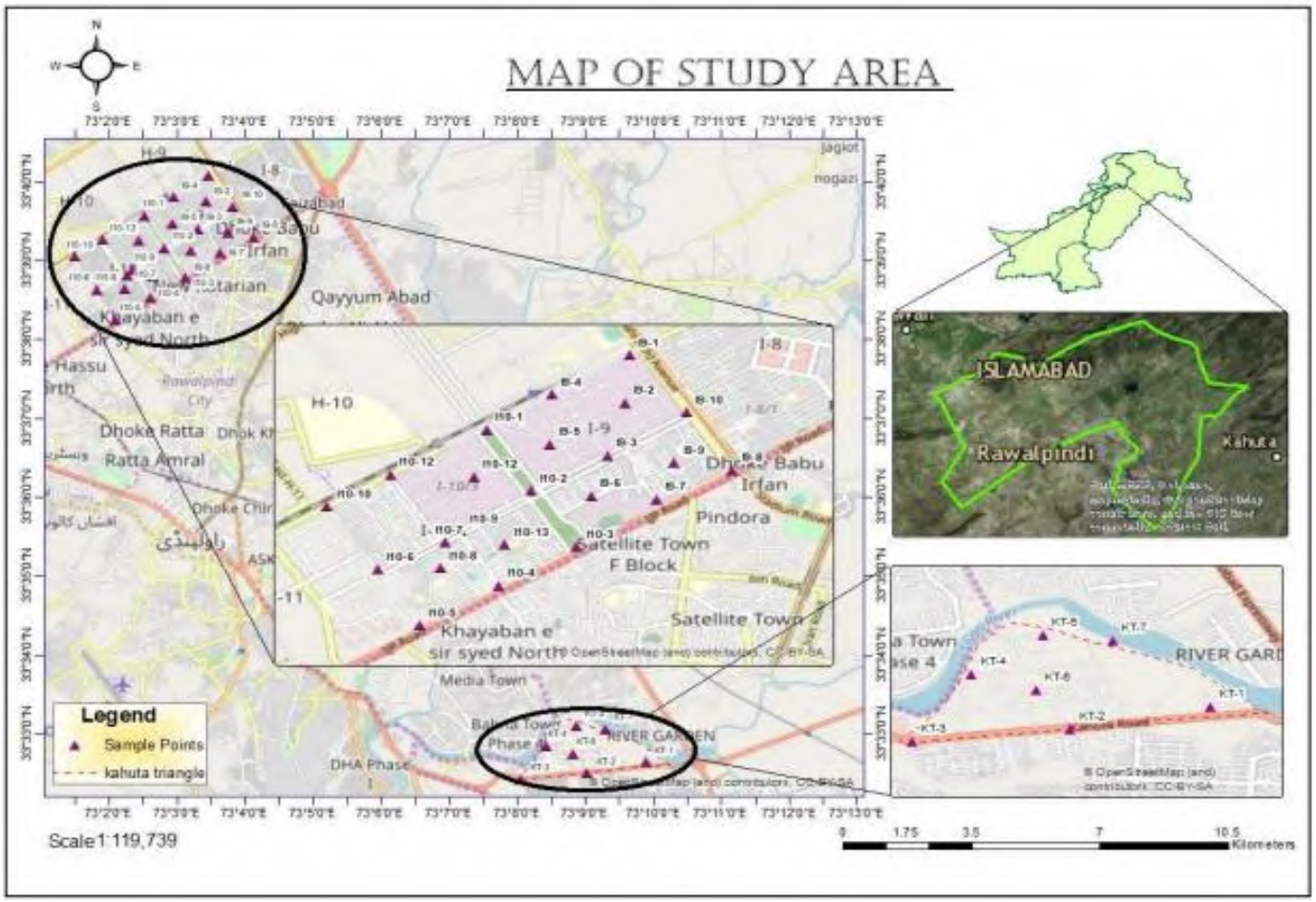
Monthly Average of Air Quality Parameters Recorded by Pak-EPA (May-2018 – June 2019):

Monthly average	**Temperature**	**Humidity**	**NO_2**	**SO_2**	**$PM_{2.5}$**
NEQS Value			***80 µg/m³***	***120 µg/m³***	***35 µg/m³***
May-18	31.91	32.70	45.13	10.39	33.02
Jun-18	31.07	39.85	21.89	16.51	23.87
Jul-18	26.56	77.99	8.62	1.93	17.16
Aug-18	26.45	87.63	9.8 7	1.45	33.73
Sep-18	30.1	75.6	22.36	28.7	29.11
Oct-18	26.7	80.4	37.8	44.32	51.72
Nov-18	18.22	70.33	44.31	48.42	50.66
Dec-18	12.66	72.72	43.66	50.36	63.4
Jan-19	6.88	68.34	31.62	47.4	45.3
Feb-19	17.13	58.7	32.53	49.34	46.7
Mar-19	17.88	70.5	33.12	52.4	41.57
Apr-19	20.34	60.43	23.4	37.6	34.1
May-19	30.21	35.68	13.65	16.4	20.8
Jun-19	27.54	34.3	12.59	11.03	29.03
PM	*Particulate Matter*				
NEQS:	*National Environmental Quality Standards*				

A. Air Quality Control & Prevention of Air Pollution

In order to control industrial air emissions, Pak-EPA directed major steel industries in Islamabad to install baghouse filters in 2018. Baghouse filters are air pollution control devices that filter the air and capture air small particulates/pollutants generated from smelting processes. Before bag house installation in industrial areas, $PM_{2.5}$ recorded as highest as 169

µg/m³ and then decreased to 17.16 µg/m³. Combustion of Solid waste burning in the capital city, created the problem that influences water pollution, soil pollution, and air pollution, all of which have serious public health implications. First engineered landfill site project is under process for ICT.



B1. Emissions from Brick Kilns

Islamabad Capital Territory has a total of 63 brick kilns, all of which function in the informal sector. Because the traditional brick kilns are not formally registered with CDA, it becomes all the more challenging for Pak-EPA to regulate environmental pollution emitted from brick kilns. Air pollution problems emanating from Islamabad's brick kilns are primarily due to poor quality of fuel used and in some cases, illegal use of banned fuel (e.g. rubber and plastic burning). To counter this problem, in 2018-19 Pak-EPA took on board Brick Kilns Association to encourage brick kilns owners of Islamabad to adopt Zig-Zag technology in conventional brick kilns, given its benefit in air pollution control. It is estimated that the zigzag brick-kiln

technology not only reduces air emissions but also decreases coal consumption by 40%, and increases fuel efficiency for brick-baking processes.

To sensitize brick kiln owners about hazards of air pollution from brick kilns, a number of meetings and awareness sessions were carried out by Pak-EPA in 2018-19. Furthermore, in order to prevent the problem of smog during winters season, brick kilns were closed in ICT from December 2018 to January, 2019.

In order to regulate emissions from brick kilns, routine monitoring of brick kilns is carried out by Environmental Monitoring Team on regular basis. During 2018-19, ten (10) brick kilns in ICT were sealed by Pak-EPA for not complying with Environmental Protection Orders (EPOs) issued for violation of PEP Act 1997.

B2. Emissions from automobiles/vehicles

Vehicular emissions are a major source of air pollution that deteriorate ambient air quality of Islamabad Capital Territory (ICT). The inefficient combustion of fossil fuel pollutes the air by releasing noxious gases, such as SO_2, CO, CO_2. Such emissions cause serious health problems for both humans and the environment. A major factor of vehicular emissions is old age diesel truck and buses. Diesel vehicles engine emit excessive graphite carbon (visible smoke) due to overloading, faulty injection nozzles and weak. In order to check ever-increasing emissions from vehicles, Pak-EPA notified the National Environmental Quality Standards (NEQS) for Motor Vehicles in 2009. The Standards were in fact adopted from international Euro-II standards for motor vehicle exhaust and noise notified as Pak-II under S.R.O No. 72(KE)/2009. However, due to dearth of Euro-II compliant petrol and diesel fuel in the market, control of vehicular emissions still remains a challenge.

Pak-EPA informed all ICT stakeholders and institutes to control their vehicular emissions, and improve the ambient air quality of the Capital city, all the vehicles running in ICT must be compliant of National Environmental Quality Standards (NEQS) for motor vehicle exhaust and noise. Pak EPA Lab/NEQS directed to NHA, ITP, and all leading universities, ministries/departments, hospitals to properly repair/maintain and tune up their organization's vehicle fleet as soon as possible to reduce the negative impacts of pollutants on environment and submit compliance/status report to this agency on priority and legal action will be taken by this agency against the non-complaint vehicles under Pakistan Environmental Protection Act, 1997, if found on the road.

Water Quality Monitoring & Control

Understanding that pollutants in the water can impact human health and the environment, Pak-EPA has developed and notified National Environmental Quality Standards for preventing and controlling water pollution in the following areas:

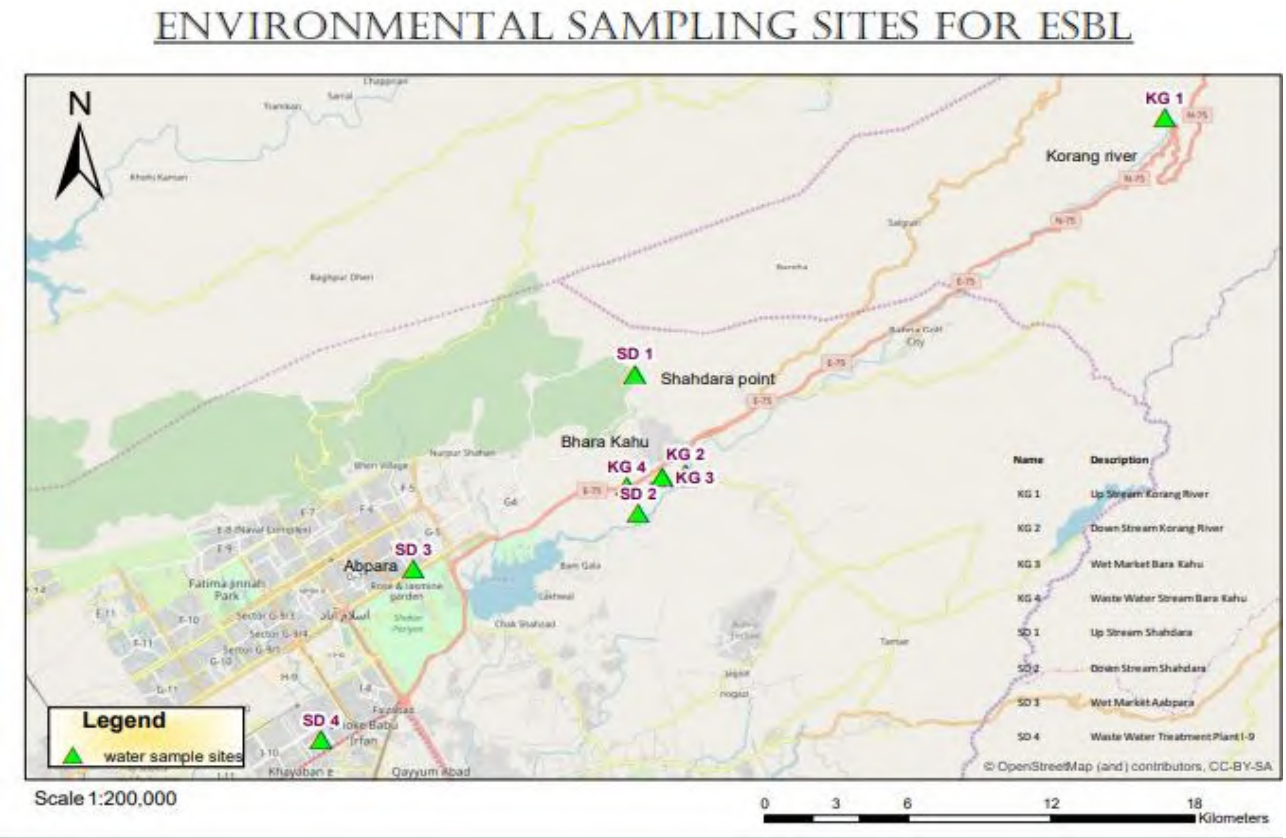
Drinking Water Quality & Control

Pak-EPA carried out chemical and microbiological analysis of drinking water samples collected from twenty-five (25) CDA filtration water plants in ICT. Pak-EPA also collected surface-water samples from natural water bodies (Rawal Lake, Simly Dam, Soan River, Korang River, etc.) in ICT. In collaboration with WHO and NARC, Pak-EPA also established an Integrated Surveillance System to monitor presence of ESBL-producing bacteria (*E. coli*) in the Islamabad's environment, wherein samples from Islamabad natural streams and rivers were collected and analysed, along with samples from wet markets and sewerage system of ICT.

In addition to the above, Pak-EPA also monitored and analyzed commercially-sold bottled drinking water samples in 2018-19. Moreover, water quality in major industries is also tested and analyzed by Pak-EPA after taking water samples during routine environmental monitoring. In 2018-19, 145 water samples from industries were collected and tested by Pak-EPA's CLEAN Laboratory.

Municipal and Industrial Waste-Water Quality & Control

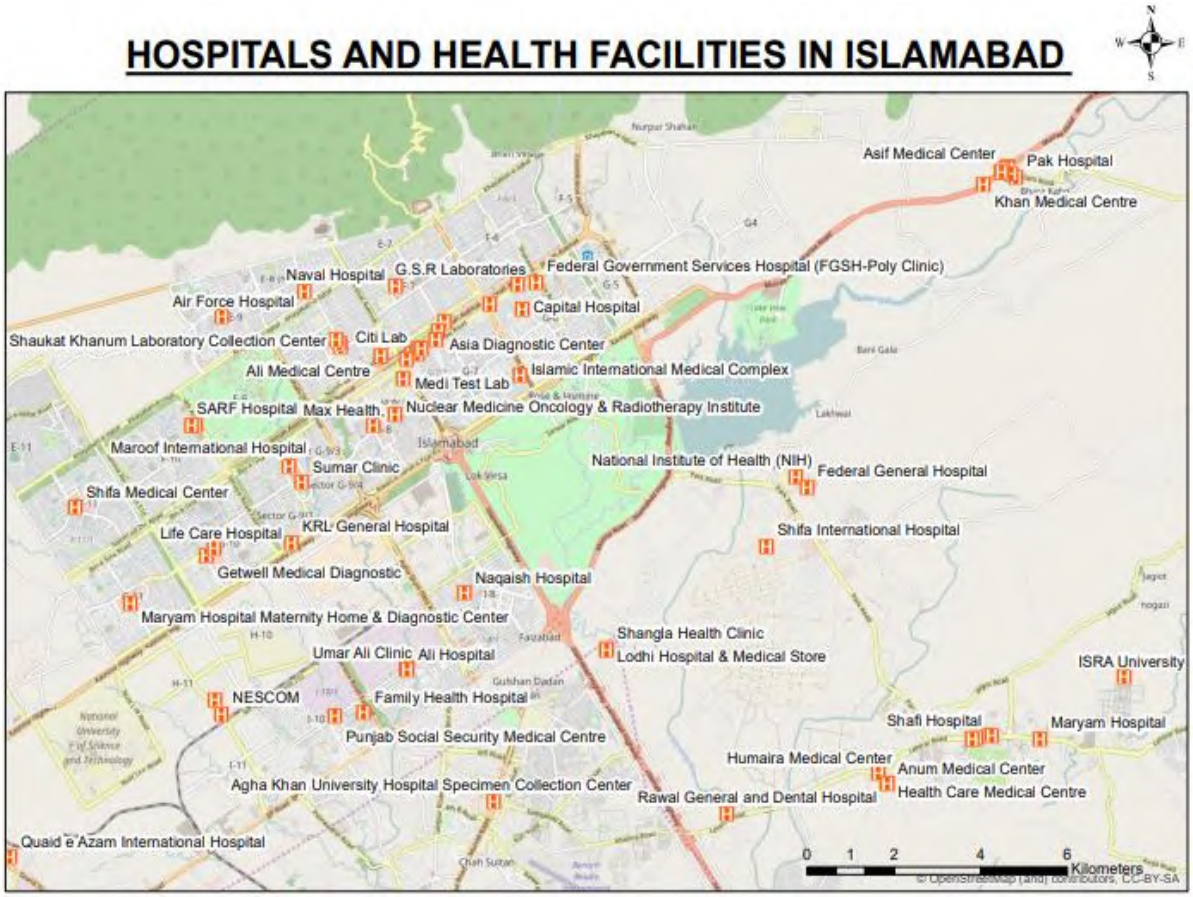
CLEAN Laboratory of Pak-EPA also collected and analyzed samples of municipal and waste-water that were collected from various industries located in ICT. Samples were also collected from CDA's Sewerage Treatment Plant in I-9 to ensure environmental compliance with NEQS standards.



A. Hospital Waste Management

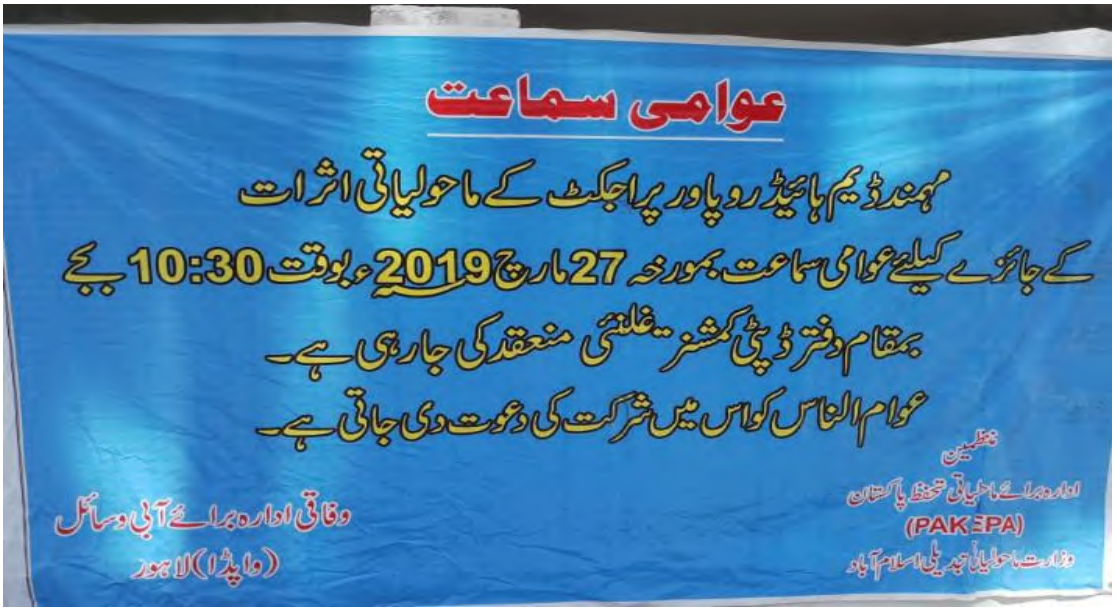
As per the Hospital Waste Management Rules notified by Pak-EPA in 2005, all hospitals and health care facilities in ICT are to ensure that hospital waste is segregated into infectious and non-infectious waste. In ICT, 96 Health Care Facilities under observation of Pak-EPA. In total, 36 health care facilities submitted compliance reports to Pak-EPA in 2018-19. Additionally, 41 violations were reported and 88 Site Inspection/Visits were conducted to ensure compliance of Hospital Waste Management Rules. A total of 7 EPOs were issued to health facilities for non-compalnce, and 05 are under litigation in Environmental Protection Tribunal. 08 incinerators are operational in Islamabad's hospitals to dispose of infectious hospital waste safely. A prolonged litigation, Pak-EPA was successful in pursuing PIMS to install two incinerators in

hospital premises in February 2019. Total reported Infectious Waste, 464.76 Metric Tons and Non-infectious, 294.10 Metric Tons generated by health facilities of Islamabad during the period from January –July,2019.



A. Environmental Approval of Projects

Directorate of Environmental Impact Assessment (EIA/IEE) evaluated the EIA/IEE reports and issuance of environmental approvals or otherwise, the EIA/Monitoring Section also conducts post environmental approval monitoring to ascertain the compliance status of the Environment Management Plan (EMP). A public hearing of the Mohmand Dam hydro project was held on 27 March 2019, in Deputy Commissioner Office Ghalanai, Mohmand District, which was attended by more than 300 persons from Mohmand, Malakand and Bajaur Districts. After the successful public hearing and fulfilling all the legal requirements, Pak-EPA, Islamabad, issued the Environmental Approval of Mohmand Dam Hydropower Project after that Prime Minister Imran Khan inaugurated construction of Mohmand Dam on May 2, 2019.



During the period 2018-19, Eleven (11) Initial Environmental Examination (IEE) Reports have been received for review at this Agency, One (01) EMP has been granted, Eight (08) cases are under process and two (02) cases have been rejected. During the same period, Ten (10) EIA Reports have been received in the Agency including all developmental projects from public and private sectors, infrastructure, residential, transmission, power generation etc. One (01) project has been granted environmental approval and Nine (09) cases are under process. During the same period Five (05) Petrol Pumps cases are received, which is under process.

The environmental monitoring team, which carries out the field activities, submits its report after ascertaining the ground situation and non-compliance by the proponents. Three (03) Monitoring visits have been carried out.

EIA directorate have been conducted Five (05) Public Hearing in EPA office. In all public hearings within the context of the EIA Process, stakeholders and proponents are brought together in a forum to express their opinions and offer suggestions on a proposed undertaking in order to influence the decision-making process. In addition, the Environmental Protection Agency (EPA) always involves the public in the review of EIA projects.

A. Environmental Law Enforcement

Legal / Enforcement Directorate of Pakistan Environmental Protection Agency plays very significant role in enforcement and implementation of environmental laws in ICT. In 2018

Legal/Enforcement Directorate finalized and notified the Pakistan Environmental Protection Agency Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bags Regulation, 2019 after approval of Federal Cabinet.

In total, 29 Environmental Protection Orders (EPOs) were issued to polluters including CDA, and industrial units under section 16(2) of PEPA Act 1997. A constructional project of M/s Sukh Chayn in F-10 was sealed due to violation of Section 12 of Pakistan Environmental Protection Act, 1997. M/s Taibah Steel was imposed fine to the tune of Rs.500,000/- for non-compliance of provision of Pakistan Environmental Protection Act, 1997. Total 106 personal hearing notices served upon on violation of PEPA act 1997 under section 11 and 12, regarding stone crusher, housing societies, commercial plazas, petrol pumps, steel industries, feed poultries, and hospitals etc.

10 Cases were filed in Environmental Protection Tribunal for violation of Environmental Laws. 06 Service Stations were sealed by the Environmental Monitoring Team (EMT) for violating Environmental Protection Orders of Pak-EPA. 10 Brick Kilns were sealed for non-compliance of Environmental Protection Orders. 05 Steel Industries were sealed in the I-9 / I-10 Industrial area of Islamabad for non-compliance of National Environmental Quality Standards (NEQS) and EPOs.

Polluters/offenders were penalized by Pak- EPA through the Environmental Protection Tribunal (EPT) to a total of Rs. 14.8 million. Furthermore, Pak-EPA actively represented environmental matters in legal proceeding/litigation on environmental related issues in Supreme Court, High Court, civil court and Environmental Protection Tribunal.

Addition of lab equipment in CLEAN Lab

In 2018, X-ray fluorescence (XRF) analyzer was added in EPA's CLEAN laboratory. XRF is used for biodegradable material, metals and heavy metals. Latest NOVA 60 Merck spectrophotometer was also added in the CLEAN lab for water quality testing in 2019. Technical training, laboratory & research facilities and summer internships were provided to about 115 students (including PhD, MS, and BS students) of various universities in 2018-2019. Quantification Of Gaseous Air Pollutants Concentration In Sectors I-9, I-10 And Kahuta Triangle Islamabad, conducted by EPA and Geomatic joint venture. Dy. Director PC, Mr. Zaighum Abbas and Dy. Director GIS, Ms Saima. Thirty (30) days continuous gaseous air

pollutants monitoring at thirty (30) different locations is carried out in potential hotspot areas of Islamabad i.e. Sector I-10, Sector I-9 and Kahuta Triangle industrial area. Monitoring parameters were NO, NO_2, NOx, SO_2, CO, O_3, CH_4, Non-methane hydrocarbons (NMHCs), and Total Hydrocarbons (THCs) along with other meteorological parameters

Environmental Complaints

The Prime Minister's Pakistan Citizen Portal was launched in fall of 2018 for the redressal of citizen grievances. In 2018-19, a total of 228 public complaints were received at Pak-EPA through the Portal, in lieu of which more than 110 site inspections were carried out, and legal action was taken against the violators reported in 28 complaints. The site inspections covered housing societies, industries, factories, poultries feeds and farms, pharmaceuticals, EIA project sites, wedding marquees, etc.

Public Awareness Raising

Pak-EPA organized numerous public awareness-raising activities in 2018-19 on air pollution, plastic pollution, and plastic-bag ban and heat wave impacts at public and private institutions. Time to time Pak-EPA also used electronic media to raise awareness among the public. Under the Prime Minister's Clean Green Programme, Pak-EPA also organized tree-plantation activities in April 2019 in Islamabad's Industrial Areas to promote the concept of green industrial zone. The events were held in collaboration with Islamabad Chamber of Commerce & Industries.

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 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.

Spatial Reference System (SRS)

A spatial reference system defines a specific map projection, as well as transformations between different spatial reference systems. Geomatic Centre 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;

Environmental planning and management with GIS and SRS

Geomatic Centre Enhanced and upgraded the institutional capacity of Pak-EPA, Ministry of Climate Change in the use of SRS, GIS and GPS for environmental monitoring and management and Collaborate with GIS & SRS department of partner universities / sector institutions in research oriented projects. Geomatic project supported 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. Geomatic Centre Facilitated 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. Geomatic Centre Provided 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.

Allocation for the year 2018-19 (very brief)

Approved Cost	48.885 (Local)	
Revised Cost:	Nil	
Allocation 2018-19	**Allocation (Local)**	**Expenditure**
	Rs. 18.205 million	Rs.14.907 million

Major activities performed during 2018-2019:

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.

Seminar on role of Media in Environment and climate change

In the case of environment and climate change, media coverage of environmental issues is not a simple collection of news articles and clips produced by journalists; rather, media coverage signifies key frames derived through complex and nonlinear relationships between scientists, policy actors, and the public that is often mediated by journalists' news stories. These frames emerge in media representations regarding a certain issue to make it more salient in a communicable text, in such a way so as to promote a particular problem and its solution.

In order to emphasis on the importance of Media in above scenario, Geomatic Centre for Climate Change & Sustainable Development, Pakistan Environmental Protection Agency, Ministry of Climate Change has organized a seminar on "Role of Media in Environment & Climate Change" to make media and means to spread environmental awareness among the people**.** Mr Shaukat Paracha, Anchor (AAp Tv), Mr. Najeeb Ahmed (CEO, FM 99) & Ms Rina Saeed (Environmental Journalist) shed light on media to be used as means of awareness raising regarding environment & climate change.

The Geomatic Center, Pak-EPA with its immense efforts and technical expertise prepared the Annual National Environment Report which was inaugurated by the Honorable State Minister for Climate Change Ms. Zartaj Gul.

Annual National Environmental Report

The National Environment Report has highlighted a wide range of Pakistan's environmental challenges and focuses on the set of issues of particular concern in the context of climate change and sustainable development. The annual national Report normally relates to an analysis of trends in the environment of a particular place. This analysis can encompass aspects such as quality of drinking and surface water, air pollution, land degradation, land use which keeps on changing with time. The rapid urbanization and motorization make these changes even more severe. There is an urgency in addressing Pakistan's environmental problems in the land, air, water, climate change and renewable energy which has become a serious development concern. The accelerated growth rate and rapid urbanization in Pakistan present additional environmental challenges. The report will be used by the policymaker, regulatory compliance monitors, the private sector and civil society organizations dealing with the

all aspects of the environment from the generation of environmental pollution up to its management in Pakistan.

Awareness raising session on Ban on plastic in Islamabad in OPF F-8/2 Islamabad

Pak-EPA has notified the regulations "Pakistan Environmental Protection Agency Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bags Regulations 2019'" under the provisions of Pakistan Environmental Protection Act, 1997 to curb environmental pollution arising from the increased accumulation of plastic bags in Islamabad Capital Territory that leads to environmental and public health hazards, choking of sewerage lines and water courses, etc. With a view to implement the said regulations, and under the directive from Prime Minister's office to raise awareness in educational institutes, Pak-EPA has adopted a multi-pronged strategies and awareness rising among the public schools/colleges/universities.

In order to sensitize on the importance of ban of plastic bags in Islamabad, Geomatic Centre for Climate Change & Sustainable Development, Pakistan Environmental Protection Agency, and Ministry of Climate Change has organized an event on "Awareness raising session on ban of plastic bags in Islamabad" at OPF girls college Islamabad to spread environmental awareness on hazardous effects of plastic pollution and on ban of use of plastic bags among the children and people.

Director General, Pak-EPA and Principal OPF girls addressed the participants and briefed students about benefits and purpose of ban on plastic bags. Moreover, she distributed prizes among the winners of debate and poster competition from different schools Students also presented skits and dialogue on ban of plastic bags.

Glacier monitoring of Pakistan using GIS/RS

Geomatic Center has taken the initiative of Glacier monitoring of Pakistan using GIS and Remote sensing technologies. In this concern, 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. A detailed report including analysis and results has been published.

Monitoring of Cement Industries of Pakistan

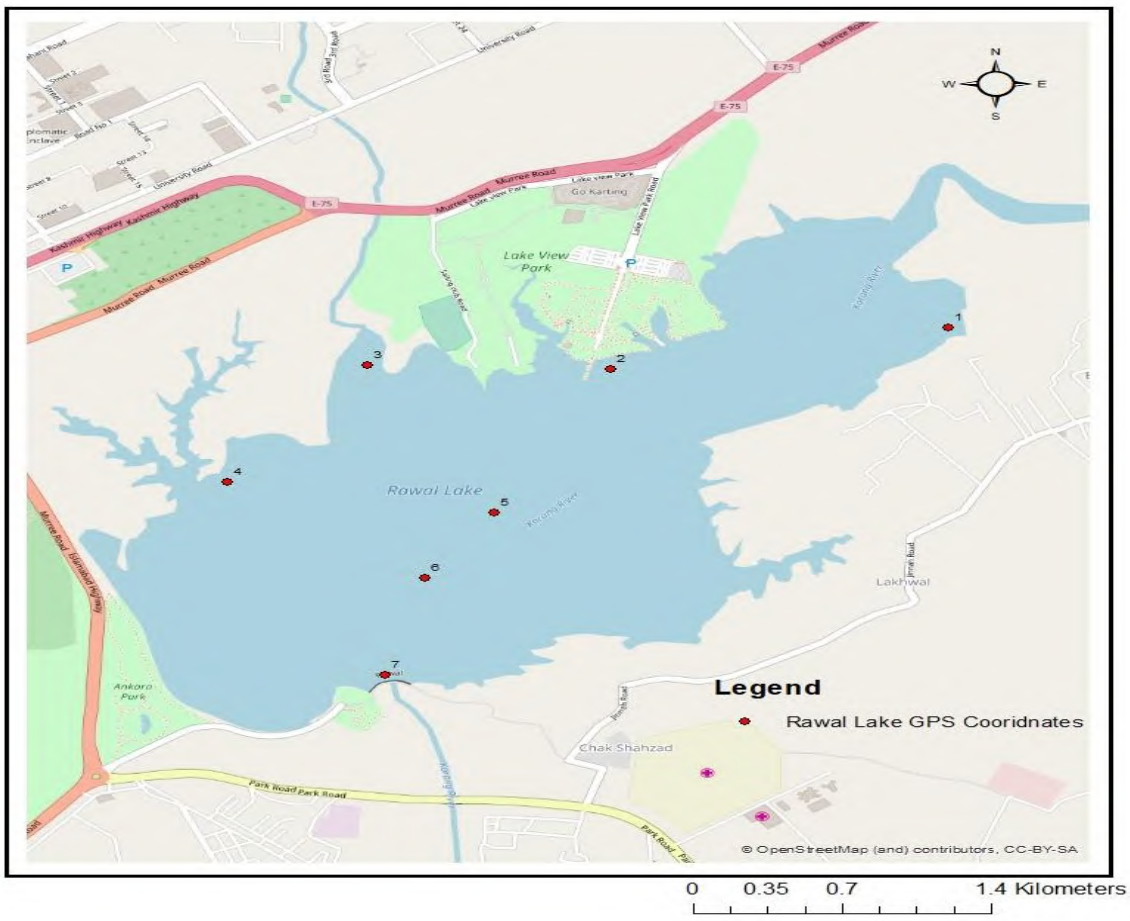
Pakistan has 24 cement plants with total installed capacity of 47 million tons. Cement industries visited to check and observe the environmental issue, regarding air pollution, water consumption, water pollution, TDF, and dumping of unsafe raw material. Fecto cement factory Islamabad, Lucky cement limited nooriabad Karachi. The Honorable Supreme Court's directed for the investigation into water usage by cement industries near the Katas Raj Temples in 2018. Special committee tasked with visiting the DG khan cement chakwal, and Bestway cement, Chao Saidan shah and Bestway Cement Kalar Kahar, to determine water storage, the industries

had been using tube wells to draw water from the ground. EPA team collected 13 water samples from underground water tank, rain water tank, power plant rejection water, steel tank, and underground water well. All samples analysed and reports submitted to Honorable Supreme Court, before the cement factories administration claimed to have stored rainwater but according to the analysed report, it has been using groundwater.

Monitoring of Rawal lake Catchment and Surrounding Areas

Rawal Lake Monitoring Committee" which is comprised of members from ICT Administration, Punjab-EPA, Pak-EPA, PCSIR, PCRWR, Small Dam Organization Punjab and WASA Rawalpindi. Water samples were being collected from eight (08) different locations which were mutually selected by the committee. Four peripheral locations were selected to assess the potential contamination entry points, two locations were in the middle of the Lake, where four samples have been taken at two different depths. One sample was taken near the spillway and one sample after treatment. Geomatic centre participated in sampling and prepared map.

RAWAL LAKE MONITORING POINTS



National Biosafety Centre (NBC)

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.

In exercise of the powers conferred by section 31 of Pakistan Environmental Protection Act (PEPA) 1997, Pak-EPA drafted and notified Pakistan Biosafety Rules 2005 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. 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 the impacts of modern biotechnology on food, health, environment, socio-economic progress of the country.

Under section 6 of National Biosafety Rules 2005, Technical Advisory Committee (TAC) comprised of 22 members including Director General Pak EPA as Chairperson and Director NIBGE, Faisalabad as Vice Chairperson. Similarly the National Biosafety Committee (NBC) comprised 17 members including Secretary, Ministry of Climate Change as Chairperson. The TORs of the both committees are defined in Pakistan Biosafety Rules, 2005. The approval process for the Genetically Modified Organisms (GMOs) involves three tiers of forum i.e.

1. Institutional Biosafety Committee (IBC), Chaired by Head of concerned 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 requires approval from all three committees.

A total 20 numbers of National Biosafety Committee (NBC) meetings and 25 numbers of Technical Advisory Committee (TAC) meetings have been convened so far to approve or otherwise the GMOs related cases.

Since July 2018, a total forty seven (47) cases of Genetically Modified Organisms (GMOs) related activities have been decided by the forum. Among these seventeen (17) cases were of laboratory genetic manipulation work, twenty six (26) cases were of field trials and four (04) cases of import and transport.

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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 Pakistan. Besides these objectives, ZSP is also mandated to maintain standard zoological collections for reference from different parts of the country and impart education and raise awareness among masses for biodiversity conservation.

The specific objectives of Zoological Survey of Pakistan are as follows:

- To obtain information on distribution, population dynamics and status of animal life in the country.
- To set up and maintain standard zoological collections for reference.
- To undertake research on the ecology and biology of wild populations of Pakistan.
- To advise the Government on all zoological matters, including conservation, management and trade in wildlife.
- To impart training and create public awareness about wildlife conservation.

Achievements of Zoological Survey of Pakistan during 2018-19 are as follows

1. **Baseline Surveys of Protected Areas**

Some of the important areas of the country having rare and threatened species of wildlife have been declared protected areas as National Park, wildlife sanctuaries or game reserve. Baseline surveys of the protected areas are essential to assess the biodiversity of the sites.

During the FY 2018-19, baseline study of Lal Sohanra National Park was carried out.

Lal Sohanra National Park

Lal Suhanra (District Bahawalpur) was declared National Park in 1972 and it is a UNESCO recognized biosphere reserve as well. The National Park has diverse habitats that include desert to semi deserts, irrigated forest plantation and wetland i.e. Patisar Lake. This diverse ecosystem is home to a variety of flora and terrestrial and aquatic fauna. Current study was initiated to develop a baseline of endangered and other fauna of LSNP and to record the threats faced by ecosystem and fauna. Park enclosures home the Blackbuck, Chinkara and Indian one horned

Rhinoceros but no wild population of these animals exist in National Park. Fragmented and small Nelgai population resides in the wilderness of the National Park. Three female Nelgai were observed in irrigated plantation near Quaid i Azam Solar Park. Enclosure at Lion Safari also hosts four Nelgai. Jackal, small mongoose, Indian porcupine, fox and desert hare are very common in the park. Caracal and wolf have been prosecuted to rarity. Wild cats including jungle cat and Indian desert cats are also found in national park. Park is also home to Indian cobra, Russel's viper and four species of lizards and three species of freshwater turtles. A diversity of terrestrial and aquatic avifauna inhabits the national park. Despite a diverse ecosystem and protected area, Park ecosystem is threatened by habitat modification, degradation and intentional plantation of eucalyptus. Moreover, commercial timbering is also a major concern in the boundary of national park. Deforestation and poaching is threatening the flora and fauna of the park. Certain non-Muslim communities also consume the wild animals and many species have become rare in the national park. Patisar Lake once a habitat for diverse flora and fauna is now drying up due to unavailability of water. It is need of hour to formulate the management plan for LSNP to check forest practices and over exploitation of the park resources. Managerial efforts are needed to restore the biological diversity and Patisar Lake. Livestock relocation and park zoning for grazing areas may also be considered along with proper boundary of LSNP along with provision of alternate livelihood options for the local community.

Studies on Endangered Animals

Houbara Bustard (*Chlamydotis undulate macqueenii)*

Houbara Bustard (*Chlamydotismacqueenii*) is one of the globally threatened bird species, which annually visits its wintering grounds in Pakistan. This bird enters Pakistan from north-west crossing a broad front through Baluchistan and Khyber Pakhtunkhwa and can be observed in all arid zones of the country. The first arrivals are usually noted in early October and birds leave their eastern winter range from late February and begin to return north-westwards. This bird is a desert adapted species that utilizes open or shrubby, level or undulating more or less arid plains uninhabited by man. It typically occurs in areas receiving 140mm-230mm annual rainfall with a temperature range of 4-34°C.

The current survey was undertaken with teams of Punjab Wildlife and Parks Department and WWF-Pakistan. Primarily, three survey teams were formed to assess the population status in three districts of Punjab province i.e. Rajanpur, Bhakar and Rahim Yar Khan. During the current survey, 1880 birds were observed in District Rajanpur and overall population of Punjab province was estimated to be 6,759 birds.

General Studies of Department

Annual Mid-Winter Waterfowl Census

Mid-winter waterfowl census is annual activity of the department since 1982 carried-out in the second week of January. During the current FY (2018-19), following wetlands of Punjab were visited for waterfowl census: Kalarkahar Lake, Namal Lake, Chashma and Jinnah Barrages, Ucchali Wetlands Complex, Rasool Barrage and Head Marrala

Sindh wetlands: Manchar, Lungh, Drigh, Hmmal, Sukkar Barrage, Mehrano, Chotyari Dam, Nurri, Sikandar Shah and Bhoosna Lakes, Haleji, Keenjhar and Hudero lakes and Karachi Coast.

Achievements

The results show a significant variation in population density of migratory water birds at all the surveyed wetlands during the current year. This is because of climatic and anthropogenic factors.

Among the migratory water birds the Common Coot (*Fulica atra*) was most common species at all the wetlands of Punjab Province. Highest number of Common Coot was observed at Chashma Barrage and Ucchali Lake. From duck family, Common Teal (*Anas crecca*) and Common Pochard (*Aythya ferina*) were found most abundant ducks, while Common Teal was observed most abundant water bird species at wetlands of Sindh.

Survey of Breeding Birds at Kalarkahar Lake

Kalar Kahar is located in District Chakwal, 30 km south west of Chakwal city in the northern edge of salt range. The area has much significance due to its Avifauna. A number of migratory water birds annually visit the wetland. The wetland is also an ideal breeding and nesting ground

for both resident and some migratory water bird species like Shoveler, Common Coot, Cotton Teal and many other resident water birds. Presence of a small population of *Pavo cristatus* (Peafowl) also makes the area important.

During the present survey 17 species of water birds were observed at Kalar Kahar Lake. Chicks and Juveniles of Little grebe, Indian Pond heron, little egrets, Cattle Egret, Purple Moorhen Common Moorhen and Common Coot were counted during the present study.

Projects of Zoological Survey of Pakistan

1. Strengthening Zoological Survey of Pakistan for undertaking immediate inventory of endangered wildlife species and habitats across Pakistan

"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.

The project was approved on 17th January, 2017 and started from 1st July, 2017 and will end on 30th June 2019. The total cost of the project is Rs: 87.726 million. The project has been revised since 2023.

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 2018-19

Workshops and Seminars:

- Inception workshop on the project ““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.

  Zoological Survey of Pakistan has initiated the PSDP project entitled “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.

  In order to introduce the project with various stakeholders, prioritize the species, habitats and seasons for study in consultation with PWD’s and NGO’s etc. and finalize the survey methodologies and enhance cooperation and coordination with provincial wildlife departments, One day inception workshop was organized on 29th May 2018 at Hotel Grand Ambassador, Islamabad.

  Mr. Shakeel Awan, Additional Secretary, Ministry of Climate Change (MOCC) was Chief Guest for the event. Representatives from Punjab and KPK Wildlife Departments, WWF Pakistan, NCCW and other institutions attended the workshop. Mr. Altaf Hussain, Director ZSP, presented the history, aims/objective and mandate of Zoological Survey of Pakistan along with ongoing research activities. Rationale and project objectives were brought forwards and discussed with participants and to make project a success suggestions were taken into account.

- **Training session on Field Research and Data Collection held with Quaid I Azam University Islamabad.**

In order to enhance the capacity of research and field staff of the department, the said training session was organized in which Dr. Irfan Zia Qureshi (Assistant Professor), Department of Animal Sciences; Quaid-I-Azam University Islamabad was resource person. During his presentation, modern ecological techniques, field survey management practices and proposal writing skills were discussed.

- **Workshop on Standardization of Survey Techniques for Preparation of Red Data Book**

The National Red Data Book is the comprehensive inventory of conservation status of species. Field surveys are required to determine the present population and conservation status of various faunal species to attain credible baseline data. The development of National Red Data Book is essential as it will highlight the status of Pakistan's fauna in terms of their range, population and conservation as well the threats faced by various species in their respective habitats.

In this regard, a national workshop was conducted on 29th April 2019 by Zoological Survey of Pakistan at The Monal, Islamabad. Federal Minister for Climate Change, Ms. Zartaj Gull was Chief Guest for the event. During her speech she urged the need for conservation of wildlife of country and appreciated the efforts undertaken for safeguarding the biological diversity of Pakistan.

The workshop was attended by various stakeholders including prestigious wildlife biologists, representatives from Provincial Wildlife Departments, International NGO's (IUCN, WWF-Pakistan, Snow Leopard Foundation, WCS), Community Based Organizations (CBOs), and academia (Quaid I Azam University, Islamabad, PMAS Arid Agriculture University, Rawalpindi, Fatima Jinnah Women University, Rawalpindi, University of Haripur) who provided valuable suggestions to develop the national document - Red Data Book.

Field Surveys:

Following field surveys have been carried out under the project umbrella

- **Field Survey for Punjab Urial at Lehri Nature Park**

  Lehri Nature Reserve comprises an area of about 69km^2 of a bit steep and rugged mountains ranging from 250 to 1025 m in altitude above mean sea level and forms the most eastern extension of the Salt Range. The reserve is centered about 10 Km from Dina town, Jhelum District of Punjab. A total 69 urials were observed during the study. These included 31females (44.9%), 3adult males (4.35%), 3 sub-adult males (4.35%), 8 sub-adult females (11.6%) and 24 lambs (34.8%). Overall population density of Punjab urial was 2.12 animals/ km^2. Overall population estimates are 147 animals in approximately 69 km^2 area of Lehri Nature Reserve.

- **Survey of Deosai National Park with Specific Reference to Endangered Fauna**

  Deosai plateau represents the important alpine ecosystem in Pakistan. To protect the unique ecology of this ecosystem, Deosai was designated as National Park in 1993 to

conserve the Himalayan Brown Bear, the flagship species. Current baseline survey was conducted to document the endangered fauna of Deosai National Park (DNP). During a four day field effort, using standard ecological methods, two endangered species i.e. Golden Marmot and Himalayan Brown Bear were recorded from DNP. Park holds a very sustainable population of Golden Marmot. Golden marmots are herbivores and spend most of their summer times in feeding. The species is always on look for potential threats and makes special whistling sound when alerted. Brown Bear population in DNP is highest in Asia. According to GB Wildlife Department, 70 to 75 bears are present in DNP. Survey team observed 4 brown bears at Bara Pani which is considered as the core bear habitat in DNP. There were also frequent reports of bear visit at camping sites in search of food. Brown bear population in Pakistan and throughout its entire range has declined dramatically except Deosai National Park. Concrete conservation efforts are requisite to guarantee the enduring survival of Brown Bears by the state departments, non-governmental organizations (NGOs), research institutes, and local communities. Currently, Deosai National Park is the focus of conservation efforts as the future of the brown bear in region will largely depend on stability in this national park. It is usually hard to get support for carnivore conservation by local communities as such efforts are questioned because carnivores don't have any meat value. Moreover, they pose threat to humans and livestock as well. Education on part of biodiversity conservation can be important instrument to change perceptions and attitude towards this group of animals. Awareness campaigns targeting thelocal communities, staff of PAs, visitors, and public can reduce the knowledge gap and help in achieving cooperation in conservation efforts.

- **Baseline Survey of Machiara National Park, AJK**

Machiara National Park (MNP) located in Muzaffarabad (AJK) is part of the Great Himalayan chain that branches off from Nanga Parbat. Machiara Forest was declared as Game Reserve in 1982, Wildlife Sanctuary in 1984 and National Park in 1996. Its elevation ranges from 2,000 to 4,700m with covering an area of 13,532ha. Baseline survey of Machiara National Park was carried out by survey team from Zoological Survey of Pakistan in collaboration of AJK Wildlife and Fisheries Department. This park is considered as hub of biodiversity harboring large number of endangered species. During current study, many important animals such as Common Leopard, Black Bear,

Red fox, Flying Kashmir squirrel, Royale's pika, Greater horseshoe bat, Indian flying fox, Himalayan Monal pheasant, Kashmir Koklass pheasant and Western horned Tragopan were encountered directly or identified through indirect evidences. Although this park is well managed by community watchers and AJK wildlife and fisheries department, more sincere efforts on the part of state government are needed to check the illegal wildlife hunting, trophy hunting, deforestation, degradation of habitat due to livestock grazing, fuel wood collection and expanding terrace agricultural practices. Machiara National Parks hold the ecologically important mammalian and bird species but population estimates of the fauna are not well documented. Management plan for conservation of species requires the population estimates and trends for its success. Therefore, it is proposed to carry out comprehensive studies on status and population abundance of key fauna in MNP. Public awareness regarding biodiversity conservation, alternate livelihood and eco-tourism can bring positive impacts on managerial issues of Machiara National Park.

- **Field Survey for Punjab Urial at Chumbi Surla and Jalalpur Wildlife Sanctuaries**

The study was conducted at Chumbi Surla and Jalalpur Wildlife Sanctuary to estimate the Punjab urial population and to document the threats to the species and habitat. Punjab Urial is endemic to Pakistan and is declared endangered as well. Estimated population of Punjab Urial in Chumbi Surla Wildlife Sanctuary was 175 heads with population density of 1.4 animals/km^2. There were 27 direct sightings which included 17 females, 9 adult males and 1 fawn. In Jalalpur Wildlife Sanctuary, 97 animals (47 female, 31 fawns and 19 males) were recorded; population estimates tend to be 253 head with population density of 4.6 animals/km^2. Urial habitat is critically threatened by anthropogenic pressure. Ever increasing need for fuel-wood is forcing people to collect resource from protected area and grazing is common activity on both the sites. Illegal hunting for meat, trophies and poaching of lambs for keeping as pet is also threatening the species. There is need for strict law enforcement to protect these populations. Capacity building and training of field staff is also needed to ensure maximum protection. Community involvement and education regarding biodiversity conservation will be effective tool to protect the natural capital.

- **Field Survey for Vultures at District Kotli and Mirpur (AJK)**

  Eight species of vultures are found in Pakistan. These are White-rumped Vulture (Gyps *bengalensis*), Indian (Long-billed) Vulture (*Gyps indicus*), Himalayan Griffon (*Gyps himalayensis*), Griffon (Eurasian) Vulture (*Gyps fulvus*), Red-headed Vulture (*Sarcogyps calvus*), Egyptian Vulture (*Neophron percnopterus*), Cinereous Vulture (*Aegypius monachus*) and the Bearded (Lammergeier) Vulture (*Gypaetus barbatus*). In early 1990s, a catastrophic population crash occurred in three species of vultures: the slender-billed vulture (*Gyps tenuirostris*), long-billed, vulture (*G. indicus*), and white-rumped vulture (*G. bengalensis*). Once numbering tens of millions throughout India and Pakistan, these Asian vultures have declined by over 99 percent and currently number less than 10,000 animals; a phenomenon termed as "Asian Vulture Crisis". In 2003, the Diclofenac, a non-steroidal anti-inflammatory drug (used to reduce the pain, fever and inflammation in livestock), was declared as the exclusive agent responsible for the rapid decline of vulture population. Current survey was a part of effort to document vulture population in Mirpur and Kotli Districts (AJK) and record subsequent threats and propose measures for conservation. Survey was carried out at Poonch River Mahseer National park, Nakyal, Tatta Pani, Palandri, Gulpur, Narr, Mori and Kas Kalyal. Four vulture species i.e. Oriental white backed vulture; *Gyps bengalensis*, Himalayan Griffon vulture; *Gyps himalayensis*, Eurasian griffon vulture; *Gyps fulvus* and Egyptian vulture; *Neophron percnopterus* were observed at only one site i.e., Garbage Dump site with Slaughter House at Poonch River Mahseer National Park at entrance of Kotli City. Food is the main limiting factor affecting the vulture distribution in AJK. In the light of results of current survey; it is highly recommended to declare the colony location as vulture safe zone and be declared as protected to conserve the population.

- **Field Survey at Kirthar National Park (Ungulates), Haleji Lake (Marsh Crocodile) and Nagar Parkar (Vultures) in Sindh Province**

  (i): Ungulates and other fauna survey at Kirthar National Park: Current studies were undertaken in the Kirthar Protected Area Complex (KPAC) during February and March 2019 with special reference to ungulates, their main habitats, distribution and status in this area. Key ungulate species of the National Park are Sind Ibex or Sind Wild

Goat (*Capra aegagrus*), Blanford Urial (*Ovis vignei blanfordis*) and Chinkara (*Gazella bennettii*). During the study, 126 Sind Ibex, 28 Urial and 4 Chinkara were recorded from Kirthar Range near Karchat Centre of KNP. While 59 Blanford Urial, 6 Sindh Ibex (1 male and 5 females) and 7 Chinkara were also recorded from Gurri Jabbal, Guth Jabbal, Thonkri Jabbal, Kund Jabbal, Peppri, Jhunjal Pahar and Mosu Areas in Khar Centre. Population density of Urial tends to be 1.75/km^2 at Kirthar Range and 2.8/km^2 at Khar Centre respectively. Estimating the population size from these results will not reflect the actual populations of these species as areas considered for surveys were smaller and much of the work was carried out in core habitat zones which have higher population densities as compared to other areas in the National Park. Carnivorous fauna of the National Park also requires systematic studies aided by technological advances. Other common inhabitants of the KNP include the Asiatic Jackal (*Canis aureus*), Indian Wild Boar (*Sus scrofa cristatus*) and Porcupine (*Hystricomorph hystricidae*). Aves species including Indian Peafowl (*Pavo cristatus*), Cinereous Vulture *(Aegypius monachus),* Himalayan Griffon Vulture (*Gyps himalayensis*) and Rock pigeon (*Columba livia*) were also observed from the KPAC. Oil exploration in KNP, drought, resource extraction, poaching, increasing human settlements, human and wildlife conflicts and degradation of habitats are the main threats to the wildlife of KNP. Moreover, population status of key ungulate species remains speculative and there is a dire need to carry out specific surveys in both core and other habitats to properly estimate the population size of the species.

(ii) Marsh Crocodile at Haleji Lake: Marsh Crocodile *(Crocodylus palustris)* is one of the threatened and vulnerable crocodilian species in Pakistan. Recent studies were conducted in Haleji Lake to estimate the marsh crocodilian population. Due to unfavorable weather conditions and strong winds, boat survey was not possible so a vehicle survey was carried out along the lake banks for direct sighting but no reptile was observed. Sindh Wildlife Department reported that approximately 200 marsh crocodiles are present in the Haleji Lake Wildlife Sanctuary (HLWS). As human settlements are increasing and land conversion agricultural practices are increased, locale and crocodiles conflicts are increasingly for food and space. People were seen collecting typha and fodder from Haleji Lake on small boats. Moreover, sheep and goats were also seen grazing along lake water body on basking sites. These practices have

resulted in human crocodile conflict. There is a dire need to properly conduct the field census for marsh crocodile in HLWS. Education and awareness is needed in local community to change their intolerant attitude towards crocodile population and disturbance during their breeding season must also be minimized to mitigate the threats.

(iii): Vulture Census at Nagar Parkar: Vultures are ecologically important as they clean up the environment by scavenging on dead carcasses. Eight species of vultures are found in Pakistan. Once numbering tens of millions throughout India and Pakistan, these Asian vultures have declined by over 99 percent and currently number less than 10,000 animals. In 2003, the Diclofenac, a non-steroidal anti-inflammatory drug (used to reduce the pain, fever and inflammation in livestock), was declared as the exclusive agent responsible for the rapid decline. The Nagarparkar area of Tharparkar district serves an important nesting and breeding ground for white-backed and long-billed vultures. "Nagarparkar remains the last stronghold of these two critically endangered vulture species in the country. Current studies were conducted in Nagarparkar during March 2019 to record the different species of vultures, their main habitats, distribution, nesting and status in this area. The occurrence of several species was found in different areas of the Nagarparkar. Three nests of long billed vultures were observed on Kharsar Jabbal. Fairly common species was Egyptian vulture and about 13 Egyptian Vultures were spotted there. Sindh Wildlife Department reported the Cinereous Vultures in Gharao Dam but no vulture was spotted in the Dam area during the current survey. Previously around 28 White Rumped vultures were reportedly nesting in the trees at Malji Jo Wando village but as trees are chopped down; their nesting sites have been destroyed. Deforestation and Granite query are main threats to the vulture population in the area.

Database Development:

Website of Zoological Survey of Pakistan prepared and uploaded (www.zsp.gov.pk)

2. "Construction of Boundary Wall of Zoo-Cum Botanical Garden Islamabad" PSDP Project

Background Information: The idea for the establishment of Zoo-Cum-Botanical Garden in Islamabad was initiated in 1968 as part of "Islamabad Capital Territory Master Plan". This

plan envisaged protection and development of natural resources in addition to providing a recreational, educational and research and a public awareness facility in the vicinity of the Federal Capital.

In 1983, a site was identified at Banni Gala Hills for the establishment of the proposed Zoo-Cum-Botanical Garden. In 1989, Capital Development Authority (CDA) handed over possession of 725 acres of land at Banni Gala Hills to Zoological Survey of Pakistan (ZSP) for this purpose. The land for National Zoo-Cum-Botanical Garden is located at Banni Gala, about 15 kilometers north east of Islamabad at an elevation range of 530 to 700m.

Prime Minister of Pakistan while considering a summary submitted by the Ministry of Climate Change on 15th February, 2017 on the subject "Construction of Boundary Wall of Zoo-Cum-Botanical Garden" had taken decision on 7th March, 2017 and directed Ministry of Climate Change that the land earmarked for the purpose shall be carefully demarcated again in conjunction with the CDA, ICT Administration and Survey of Pakistan. The length of the wall required will be measured after the land has been re-demarcated and cost estimates should be prepared accordingly. Further the boundary wall shall be built with rock blocks or other suitable material and covered with creepers, climbers or other similar plantation so that the structure blends with the environment.

The Project is also in line with relevant component on Climate Change and Environment of Vision 2025 wherein it has been committed to "promote long term sustainability, conservation and protection of natural resources" and a new international framework introduced to promote sustainable development. This international 2030 UN Development Agenda known as sustainable development Goals (SGDs.

In view of the importance of this initiative, the project warrants to be included in the 11th Five Year Plan. Project will be financed during the current financial year from the funds already allocated for the Green Pakistan Programme, and any resultant shortfall in the funding requirements of the Green Pakistan Programme will be met through saving from the PSDP 2016-17.

The Main Objective of the project is to protect precious state land earmarked for the establishment of national zoo-cum-botanical garden from encroachment and land grabbers and

also promote ex-situ conservation of biological diversity through such ecologically targeted initiatives.

Project Objectives:

The project started from 1st July, 2017 and end on 30th June 2019. The total cost of the project is Rs: 103.494 million. The objectives of the project are as under:-

- Ensure protection of state land from land grabbers by construction of boundary wall of the zoo-cum-botanical garden; and
- Once the area has been secured, the internal development of the proposed garden will be carried out through a separate PC-I

DEMARCATION OF STATE LAND OF ZOO-CUM-BOTANICAL GARDEN IN 2003-04

- In 2003-04 demarcation work was completed by Survey of Pakistan with collaboration of CDA, Revenue Department, ICT Administration and Punjab Forest Department. 160 pillars were erected, fenced with iron wire.

LITIGATION CASES:

- After the above stated demarcation, the land grabbers encroached into the government land. Removed and dislocate the pillars erected in light of demarcation carried out by Survey of Pakistan.
- FIR's and Court cases were lodged by the Zoological Survey of Pakistan (ZSP) against land grabbers in different courts of Islamabad.
- In this regard Sue Moto has also been taken by Supreme Court of Pakistan and on 04-04-2018 the Honorable apex Court directed to Civil, Session and High Courts of Islamabad that these cases may be decided within month time.

RE-DEMARCATION IN 2017

- In 2017 before the start of civil work of ZCBG Boundary Wall, the re-demarcation work was completed by the Survey of Pakistan with collaboration of CDA, Revenue Department and ICT-Administration. Report was submitted to Zoological Survey of

Pakistan, Ministry of Climate Change. According to Report submitted by Survey of Pakistan:

- Out of 160 Pillars
  - 70 Boundary pillars were found in original status.
  - 60 Pillars were found physically damaged.
  - 13 Pillars were displaced.
  - 17 Pillars were completely destroyed.

ACHIEVEMENTS OF THE PROJECT DURING FY 2018-19

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

Honorable Supreme Court of Pakistan issued the judgment on dated 10th December, 2018 regarding land encroachment and directed the ICT-Administration and CDA for the retrieval of the state land of ZCBG. As per directions, operation was conducted and encroached land was retrieved and possession was handed over to Zoological Survey of Pakistan. Total encroached land was 2,320 Kanals which is recovered by ICT-Administration and CDA.

In the FY 2018-19, all the 14 km area, cleared and boundary wall has been completed along with masonry work. In the next phase development of the Zoo-cum botanical garden will be carried out and a state of art botanical garden will be developed.

BENEFITS OF PROJECT

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

PUBLICATIONS

The department is regularly publishing scientific Journal “Records Zoological Survey of Pakistan”, brochures and charts etc.

During 2018-19 following journal was published.

Records Zoological Survey of Pakistan Vol.23.

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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 Centre 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***: using climate 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 snow and glaciers, aggregate and

- seasonal impacts on flows in the Indus River System, and changes in the hydrological extremes across the country.
- ***Agriculture, Forestry & Land Use****:* using crop simulation models to predict the impact of projected changes in temperature, precipitation, and water availability on agriculture 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, policymakers, and to the public at large, in order to raising awareness of climate change among policymakers as well as the citizenry.

3. Ongoing Research Activities

I. Climatology & Environment Section

The key research activities of Climatology & Environment Section revolve around following themes:

- Assessment of past climatic changes;
- Development of future climate projections for Pakistan by employing state-of-the-art high resolution Climate Models;
- Scientific Investigation and Prediction of Climatic Extremes by using modeling as well as statistical techniques;
- Simulation modeling to study monsoon dynamics and its associated impacts;
- Intra seasonal to inter decadal climate predictions;
- Development & Updating of GHG Inventory of Pakistan for Energy & Industrial Processes Sectors;

- Research dissemination (International and national science journals and books, policy briefs, press releases);
- Capacity building and awareness raising.

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:

During the year, GCISC made significant contribution to the international scientific literature in the field of climate change and its associated impacts, and made tangible contribution in a

no. of research projects. It also organized a no. of workshops/seminars for information dissemination and awareness. The following is a summary of the accomplishments in 2018-19:

- Publication of key research findings in scientific journals = 16
- Contribution towards technical reports = 08
- Contributions in research projects = 06
- Provision of training to university students from across Pakistan in the field of climate change through summer internship program = 18
- Organization of scientific activities/workshops/seminars for information dissemination and awareness = 35
- GCISC experts delivered lectures as resource persons and imparted trainings to the researchers of various organizations = 25
- Played key role in the preparation of Pakistan's Second National Communication to UNFCCC.
- One GCISC scientist has been elected as Rapporteur in UNFCCC's Consultative Group of Experts (CGE).
- Two GCISC scientists are contributing as Lead Authors for IPCC 2019 Refinement to IPCC 2006 Greenhouse Gas Inventories Guidelines
- A group of GCISC scientists made significant scientific contribution for R-SMOG (2018) Study conducted by Food and Agriculture Organization of the United Nations (FAO).
- Two scientists from GCISC are contributing as Lead Author for IPCC 6th Assessment Report.

A. Salient Research Studies/ Reports

(a) Assessment of temperature and precipitation based climate extremes in future projections over Pakistan

The study provides an insight of observed (1996-2005) and future extreme events over Pakistan by using statistical downscaling/bias-correction methods. The results show that the temperature over whole country is increasing at a higher rate as compared to global mean. The projected changes in daily minimum temperature (warm and cold nights) are more prominent than that for daily maximum temperature (warm and cold days) with

respect to duration and frequency. Therefore, the rate of change in the minimum temperatures contribute more strongly to the overall increase of temperatures. Moreover, the highest increase in temperature is observed over north as compared to southern Pakistan. This increased warming will result in more rainfall events and can also intensify the hydrological cycles in most of the parts of Pakistan that may lead to flooding and drought at the regional scale. However, the lower agreement is observed in case of precipitation extremes among CMIP5 models than temperature extremes. The results over Pakistan are in agreement with global studies which indicate that anthropogenic activities would cause fewer cold extremes and more warm extremes in 21st century. Some key findings are presented in Fig. 1.

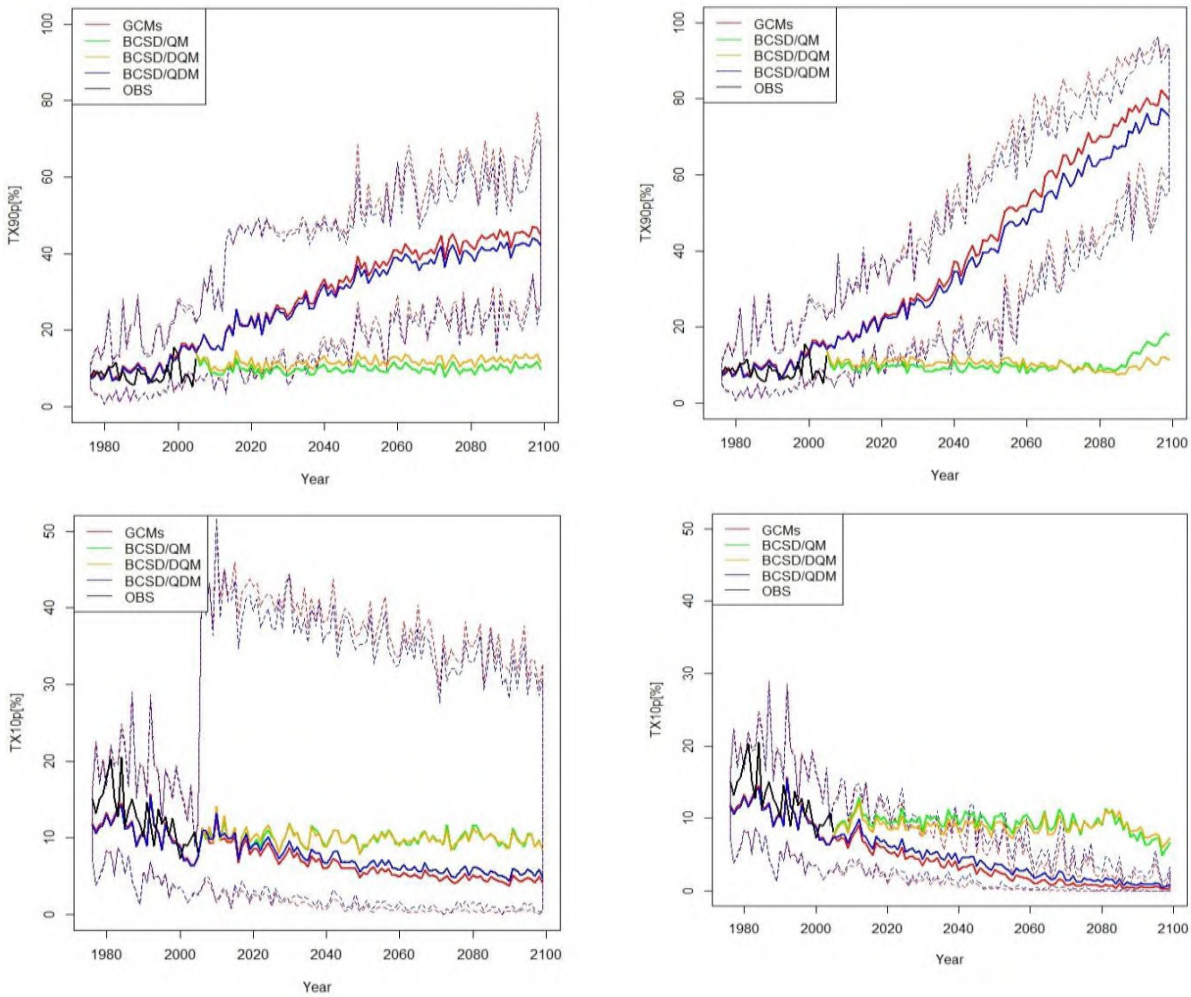


Fig.1: Trends of temperature extremes (TX90p, TX10p) from 1976 to 2099, downscaled for RCP4.5 (left panel) and RCP8.5 (right panel) over Pakistan.

(b) Spatio-temporal variability of summer monsoon over Pakistan

The study indicates inter-decadal spatial and temporal variability in the precipitation related to the monsoon onset in Pakistan. This study provides a detailed insight to the monsoon onset over Pakistan from 1971 to 2010. Analysis of 40 years of data revealed variations in the time of summer monsoon onset over Pakistan. The temporal analysis shows that monsoon onset has an earlier shift in Pakistan region. Although there are certain factors, which effect the monsoon, system such as ENSO that has caused a delay in the monsoon onset during the decade of 1981–1990. Therefore, the study concludes that mean monsoon onset over 40 years has a shift to an earlier time in the whole region. The key findings of the study are shown in Fig 2.

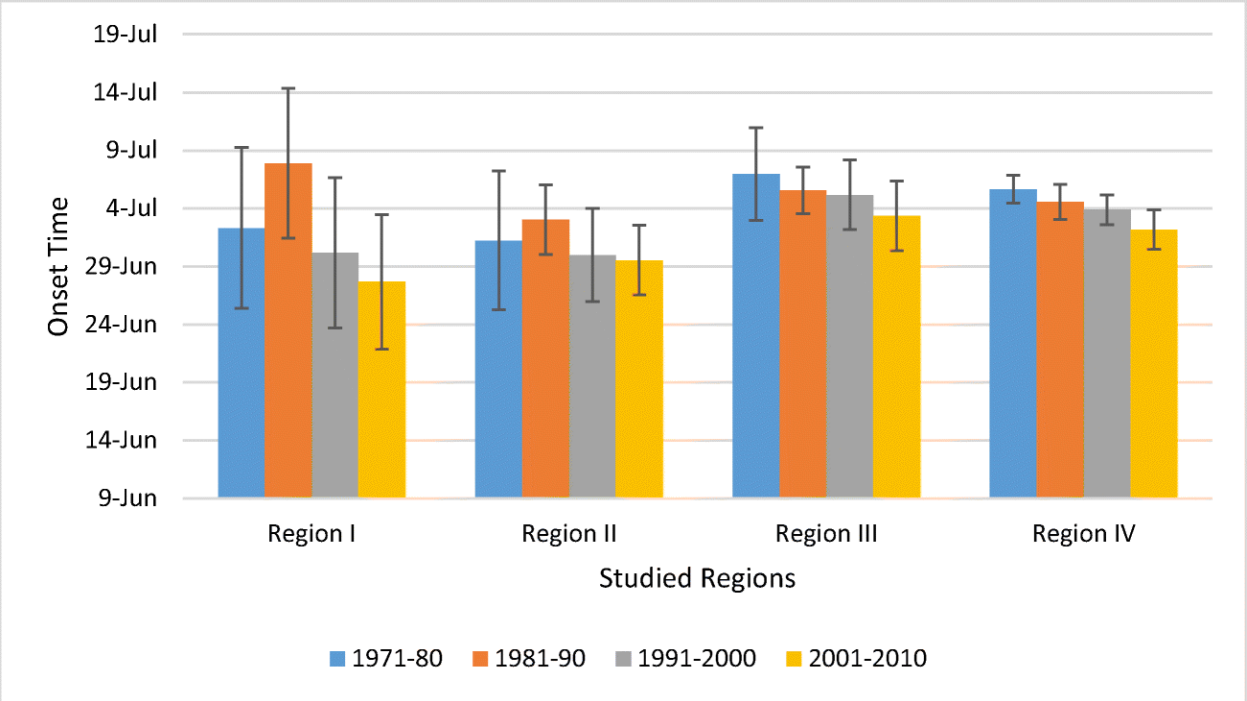


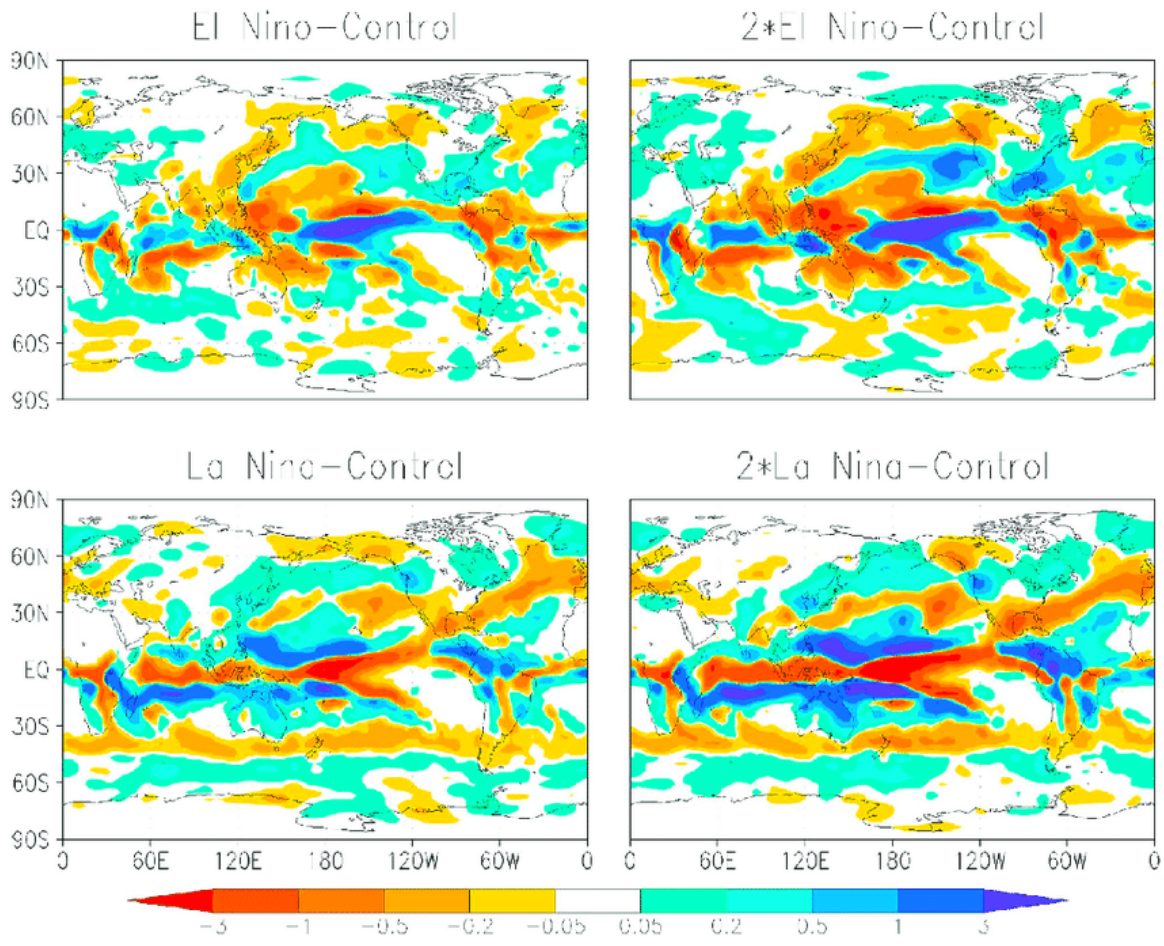
Fig.2: Standard deviation of monsoon onset in four regions of Pakistan over the four decades from 1971 to 2010)

(c) Assessment of Linkages of seasonal predictability to global climate patterns

This study is an attempt to highlight the global and regional climatic impact of increased magnitude of ENSO Modoki in winter and summer seasons. The study also tries to see how effectively ICTP-AGCM can reproduce ENSO Modoki-induced teleconnection patterns, especially in the South Asian and tropical MENA domain as these regions appears to be very sensitive to ENSO induced changes. In this study, ENSO Modoki sensitivity experiments have

been conducted using ICTP-AGCM (SPEEDY). One of the main interests of this study is to see how sensitive is the global and regional climate to ENSO Modoki strength. The results show that the global and regional climatic impacts of ENSO are very sensitive to the intensity of ENSO phases in the tropical Pacific region. Increased magnitude of ENSO Modoki significantly affects Hadley and Walker circulations both in winter and summer season, that in turn induce considerable impact upon rainfall distribution in the tropical areas. El Nino/La Nina induced Hadley and Walker circulations result in decreased/increased rainfall activity, especially in the tropical rain belt areas of MENA and South Asia. The results further reveal that precipitation changes induced by ENSO Modoki are largely consistent with the precipitation response induced by conventional ENSO; however, the ENSO Modoki induced precipitation anomalies seem relatively weaker than produced by conventional ENSO.

Fig.3: Composited mean precipitation (mm/d) anomaly (experiment -control) following El Niño and La Niña Modoki forcing in winter (DJF) season



(d) Investigation of the impacts of anthropogenic radiative forcing

A study has also been performed on the investigation of the impacts of anthropogenic radiative forcing, produced by the rise in the atmospheric concentrations of CO_2, on the diurnal temperature range. By using a sophisticated radiative-convective model of the diurnal cycle, the effects of increased CO2 on the diurnal distribution of surface temperature, radiation fluxes, and water contents are evaluated. This study concludes that CO2 plays a major role in the climatic variability of the mid-latitude semi-dry regions.

(e) Sensitivity of the monsoon regions to explosive volcanism and volcanic-induced ENSO forcing

In this study performed by Climatology Section, sensitivity of the monsoon regions to explosive volcanism and volcanic-induced ENSO forcing is studied to better understand the driving mechanism and climate variability in south Asian and African region. Using observations and a high resolution atmospheric model, effectively at 50- and 25-km grid spacing, this study shows that ENSO and tropical eruptions together weaken the upward branch of Northern Hemisphere (NH) Hadley cell, that is, Intertropical Convergence Zone. This results in a significant decrease of monsoonal precipitation, suggesting severe drought conditions over the NH tropical rain belt regions. The volcanic-induced direct radiative cooling and associated land-sea thermal contrast result in significant warming and drying due to the reduction of clouds over the monsoon regions in boreal summer. The post eruption ENSO circulation also results in warming and drying over NH tropical rain belt regions. This study confirms that the monsoon climate regime responds vigorously to post eruption direct radiative and indirect circulation impacts caused by volcanic-induced ENSO forcing. Hence, quantification of magnitude and spatial pattern of these post volcanic direct and indirect climatic responses is important for better understanding of climate variability and changes in Asian and African monsoon regions.

(f) Spatio-Temporal Analysis of Early Twenty-First Century Areal Changes in the Kabul River Basin Cryosphere,

A GCISC-led modelling study reveals that under future climate change scenarios, seasonal snow in the basin is likely to melt faster and earlier (Figure 4), thereby causing more frequent

and higher magnitude extreme flow events in the form of localized flash floods in the mountainous part and larger floods in the flatter terrain (mostly in KP province of Pakistan e.g. Noshera and adjacent areas) of the basin. It poses a huge threat to a major proportion of the population living in the KRB on both sides of the border.

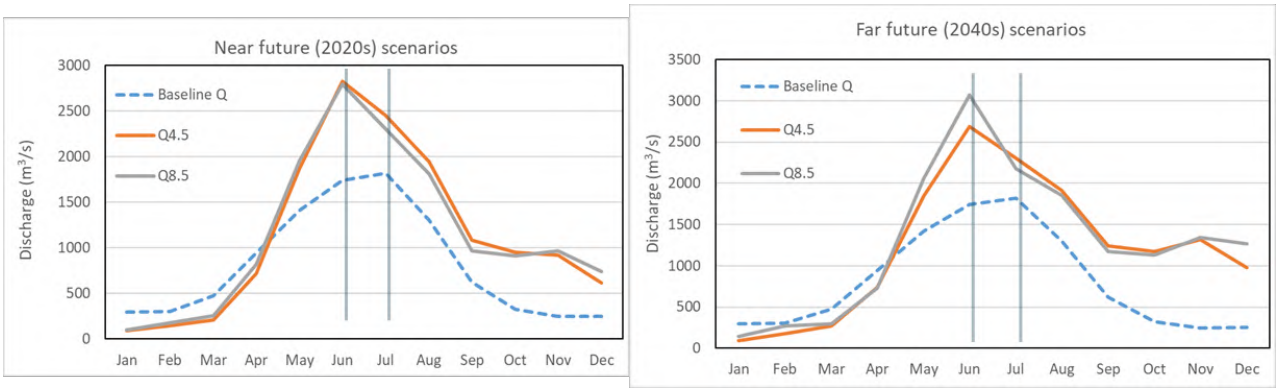


Figure 4

The study proposes following policy recommendations:

- *A joint campaign by the Meteorological agencies of the two riparian countries for installation of climate and river flow gauging sites in the basin, especially on the Afghanistan side which has virtually no long term data available required for a reliable climate analysis. It will help improve hydrological monitoring and climate change impact assessment research studies in the KRB. In this regard, Pakistan has better capacity and can offer full technical support to Afghanistan*
- *Joint watershed management practices including tree plantation to reduce soil erosion and flood risk, and flood plain management (restoring and creating wetlands) to make beneficial use of flood flows*
- *A formal mechanism of cooperation/coordination among the national weather and flood forecasting agencies in both the countries through enhanced knowledge and data sharing and mutual capacity building*
- *Developing jointly run flood early warning systems for saving as much as possible lives and property in both the countries.*

(g) Impact of climate change on the mean summer runoff of the Chitral River

In a modelling study, the impact of climate change on the mean summer runoff of the Chitral River was determined by applying the RCP climate change scenarios using SRM snow hydrology model. Basin's simulated discharge of year 2000 was taken as a base year for projecting the future runoff.

An increase of ~13–37% was estimated in the mean summer runoff of Chitral River basin under mid and late-21st century low to high emission RCP scenarios (Figure 5). The increase in runoff is a result of increasing precipitation and warming trend, which leads to melting of snow and glaciers in Chitral

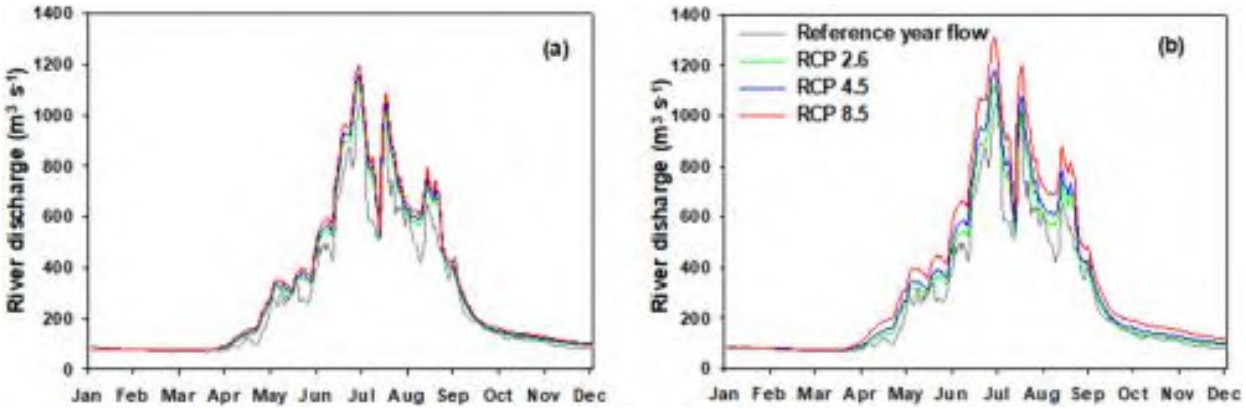
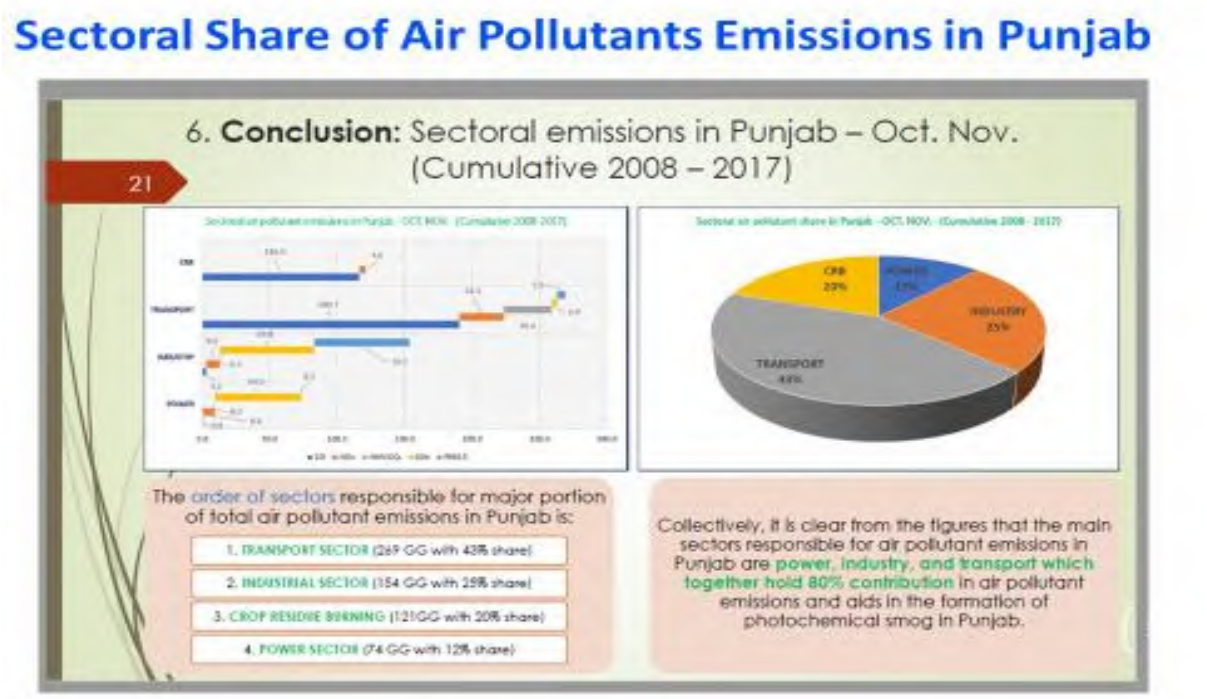


Figure 5: Simulation of the Chitral River discharge under RCP 2.6, 4.5 and 8.5 climate change scenarios for the (a) mid-21st century, and the (b) late-21st century

(h) Remote sensing for spatio-temporal mapping of smog in Punjab and identification of the underlying causes using GIS techniques (R-SMOG)

GCISC contributed to study which was launched by FAO Pakistan to investigate the underlying causes of Smog in Punjab and its relation to crop residue burning. The report, The study clearly demonstrated that seasonal climatology plays a vital role in transport of different kinds of air pollutants affecting day to day human activities. HYSPLIT model based findings indicated that buildup of anthropogenic aerosols mainly has been taking place in winter (December, January, February, March) and post-monsoon (October, November) for which region wise point source locations were identified. It was found that 65 % of the sources were detected

within Pakistan. Secondly, sectoral contribution of pollutants (NOx, SOx, PM2.5, CO, and NMVOCs) based on the data of last 10 years (2008-17) was determined using IPCC methodologies. The outcomes demonstrate the transport sector as biggest contributor (43%) in total air pollutants emission in Punjab while the rice residue burning adds just 20%. Besides, Industry and Power sectors holds 25% and 12% respectively. Overall, the energy sector occupies 80% of the total air pollutants emissions in Punjab. The emissions of NOx, being main pollutant responsible for smog formation, are highest from transport sector (58%). Industry, and Power collectively holds 34% share in NOx emissions while rice residue burning



is just at 9%.%). The key recommendations of the above said study for the reduction of air pollutant emissions are based mainly on the analysis performed at GCISC. The key findings are shown in Figure 6.

Fig. 6: Sectoral share of air pollutants emissions in Punjab for Oct. and Nov. (Cumulative 2008 – 2017).

(i) Multi-criteria decision analysis for flood risk on the Chenab River

Pakistan has suffered cumulative economic losses of US$38.165 billion due to 23 major flood events since its independence. This study was conducted to categorize possible flood risks using the Multi-Criteria Decision Analysis (MCDA) approach along the valley of the Chenab River reach from Maralla to Qadirabad for the flood of September 2014. The study

aims to (i) determination of potential flood hazard zones, (ii) development of flood and risk assessment maps, and (iii) preparation of a flood hazard index (FHI) map. The finding of the study (Figure 8) showed that 11.47% of the total area are at high risk having a flood risk index value of 95-150. Similarly, 29.53, 36.63 and 22.37% of the area are at high, medium and low risk having flood risk index value of 80-95, 65-80 and 34-65 respectively. The results showed that the MCDA approach in combination with GIS techniques are useful for accurate flood risk analysis and mapping.

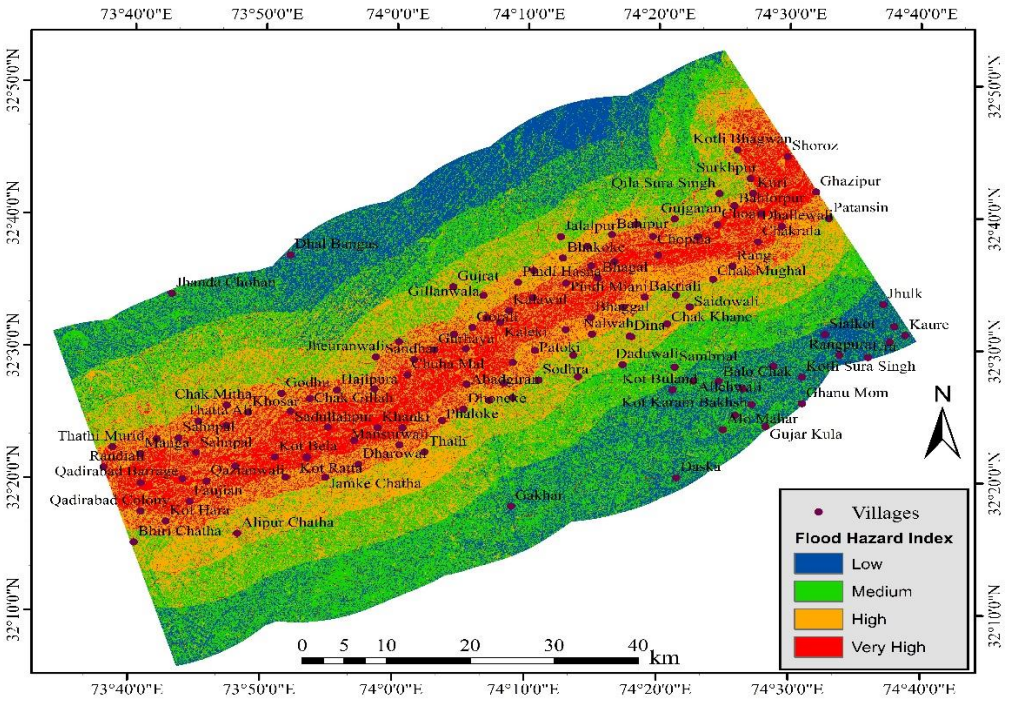


Figure 7. Flood Hazard Index map

(j) Drought Risk Assessment: A Case Study in Punjab, Pakistan

Drought is a natural hazard spreading gradually and caused serious harm to nature. Pakistan is one the counties which is affected badly by drought. In near Past, Pakistan faced one of the worst drought span drought from 1998 to 2003 which harshly affected socially and economically. The present study was conducted on dry land areas of Punjab-Pakistan. The main aim of the study is to analyze change in vegetation cover due to change in SPI and NDVI for barren, sparse and dense vegetation areas. The overall results if the study are summarized in table below.

Table 1: Summarized results

Indices	Feb	Mar – Apr	May-Jul	Aug-Oct	Nov-Dec
NDVI	mild drought conditions in the center of study area	Conditions harden in center	drought started to mature at east and west boundaries of region	drought happening to grow in extreme North	Drought happening to evacuate from region and dry condition started to scatter
VCI		Drought situations strengthen in middle of study area	Appeared at south, east and west boundaries	Intensive	
Standardized Precipitation Index (SPI)	Mianwali, moderate dry conditions, Jhang, severe dry condition, Bhakar, Khushab, Liah and Muzafarghr, saved from dry conditions				

(k) 2019 Refinement to IPCC 2006 Greenhouse Gas Inventories Guidelines

Based on the decision of Task Force Bureau, Taskforce on National Greenhouse Gas Inventories (TFI) conducted a technical assessment of IPCC 2006 GHG-I guidelines.

The technical assessment revealed that there has been abundant new scientific and empirical knowledge published since 2006 which the IPCC should consider, particularly with respect to data for emission factor development for some categories and gases. Consequently, the necessity and usefulness of *refining* the current methodological guidance (e.g. updating default emission factors) was recognized by TFB and refinement process was started by selecting the Coordinating Lead Authors, Lead Authors, Contributing Authors and Reviewers.

Two GCISC scientists (namely Muhammad Arif Goheer, Head-Agriculture, Forestry & Land Use and Muhammad Ijaz, SSO) contributed to the Voulmes on Agriculture, Forestry & Land

Use and Waste Sectors respectively. The emission coefficients have been revised and the new methodologies on estimation of emissions have been reported.

(l) Assessing Crop Water Requirements under Channing Climate

Water is central to crop production. While climate changes are negatively affecting crop production though reduction crop yields, altering the cropping cycle and increasing the crop water demand. In order to quantify the impact of climate change on net irrigation requirements of various field crops a set of studies has been initiated in the Agriculture Section. Under this program the crop water requirements for five major crops will be estimated in different cropping zones of the country and future water demands will be assessed. One of the study 'Climate Change Implications for Wheat Crop in D.I.Khan' was published in 2017. Work on the study of wheat water requirements on Bahawalpur and Faisalabad.

The study reports that a significant increase in CWR of Wheat has been observed over both selected sites. It is also noted that semi-arid climatology is more affected by climate change as compared to arid. The CWRs of wheat will increase by 3.01% and 6.86% in Faisalabad and by 2.46% and 5.64% in Bahawalpur for RCPs 4.5 and 8.5, respectively. Semi-arid climatic conditions will suffer more in terms of increased NIR as compared to arid climatic conditions. The net irrigation requirements will increase by 5.49 % and 10% in Faisalabad district and by 2.41% and 5.86% in Bahawalpur for RCPs 4.5 and 8.5. Effective rainfall patterns showed a decline of 9.79% and 10.07% in Faisalabad, over all the selected future time series for both RCPs 4.5 and 8.5 respectively while in Bahawalpur overall effective rainfall increased by 3.16% and 2.81% against RCPs 4.5 and decrease against RCPs 8.5. There has been an inverse relationship between Net irrigation requirements and effective rainfall over selected sites for all the future time series and selected RCPs 4.5 and 8.5. The paper is currently in the process of review.

(m) Second National Communication (SNC)

The project 'Pakistan: enabling Activities for the Preparation of Pakistan's Second National Communication (SNC) under United Nations Framework Convention to Climate Change' funded by UNEP was awarded to Ministry of Climate change. An MOU was signed between GCISC and MOCC and GCISC contributed to the following outcomes of the report:

- Representative description of National Circumstances
- National Inventory Report
- Vulnerability and adaptation assessment for key sectors of National economy
- Integrating Climate change considerations into social, economic and environmental policies
- Research and Systematic Observation
- Report on constraints and gaps and related financial, technical and capacity needs in the implementation of Convention

The report provides a detailed stock of information on the aforementioned aspects from 2004 onwards, national vulnerabilities, action and strategies to combat the climate change challenge. The report was submitted to UNFCCC by Ministry of Climate Change in August 2020 and can be assessed at the UNFCCC website.

(n) Preparation of National GHG-Inventory Report (NIR)

As part of the work on Second National Communication, GCISC prepared the National Inventory Report (NIR). As per inventory report, the total estimated GHG emissions for the year 2015 are 408.1 million tons of CO_2 equivalents with 45.5% share of Energy sector, 42.7% share of Agriculture, 5.4% share of Industrial Processes, 3.8% share of Waste and 2.5% share of Land-Use Change and Forestry (LUCF) sector.

(o) Collaborative Climate Change Related Research Studies

GCISC is pursuing collaborative climate change related studies with various Universities and Research institutions on the aspects of (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; (c) disaster management under the impact of climate change; (d) climate finance; and (e) from climate policy to implementation. In the context above, forty studies (40) with nineteen (19) institutes have been carried out. Details are available in the Section 17 (a) of the Annex-I.

B. Capacity Building:

Capacity building is an important component of GCISC's activities. Climate change still is an evolving science. The new concepts, tools and methodologies for impact assessment emerge

quite frequently. Capacitate the Centre's researchers as well as other institutions with upcoming technologies and skills is imperative for quality research and action.

During 2018-19, the Centre's scientists participated in a number of national/ international training workshops and acquired new skills ranging from climate science, climate modeling, seasonal forecasting, early warning systems, drought monitoring and assessments, hydrological, crop simulation and water management modeling, water surface runoff analysis, water-food-energy nexus, to earth observation systems, space technology and RS/GIS tools. In some the workshops GCISC's scientists also contributed as resources persons. The details of participation are available in Section 11 of Annex-I. The acquired skills are being used for the ongoing and planned research activities at the Centre.

Given the complex and evolving nature of the climate change subject, the international mentorship of the Centre's scientists is very much essential. To fill this gap, the Centre has declared some world renowned scientists, majority of them are Pakistani expatriates, as Senior Fellows. GCISC's researchers are engaged with in various research studies. A list of these fellows along with their expertise is available at Section 17(b) off the Annex-I.

Eighteen (18) students from National University of Science and Technology (NUST), Islamabad, Bahria University, Islamabad, PMAS-Arid Agriculture University Rawalpindi. University of Agriculture, Faisalabad and University of Engineering & Technology (UET) Peshawar attended GCISC as Interns for a period of 2-3 months. The Centre's researchers provided them orientation lectures on climate science, modeling and other analytical skills and supervised them for various studies assigned to them by their university teachers. The details of the students is available in Section 14 of Annex-I.

The Centre has also started a series of lectures called as 'Friday Seminar' in which GCISC's own as well as researchers from other institutions deliver lectures on the latest ongoing research and present studies on the aspects of climate sciences, sectoral impacts and response strategies. During 2018-19, twenty-nine (29) seminars were organized at GCISC. The details of the Seminars are available in Section 15 of the Annex-I

C. Mass Awareness / Media Appearance:

The Centre's scientists published six news articles in the leading national newspapers on the various aspects of climate science and its associated impacts on water, agriculture, forestry as well as on climate change negotiation and probable outcomes in COP-24. An exclusive programme to highlight the climate change and allied impacts was broadcasted on PTV world in which GCISC Scientists highlighted the implications of Climate Change for the country and how the researchers are providing support for informed policy and decision making. In a Live Radio Programme "Raabta", GCISC's scientist discussed the issues of climate vulnerabilities to agriculture sector and how the ordinary farmers can adapt to minimize the risks and increase resilience.

The details of the newspaper articles and electronic media programs are available in Section 13 of Annex-I

D. Inputs for parliamentary Business

GCISC, being the research arm of the Ministry of Climate Change is frequently engaged for providing technical inputs on climate change, impacts and response strategies for parliamentary business. In this regard GCISC provide answers to National Assembly and Senate questions and also contributes to the proceedings of the standing committees on the concerns of climate change. During 2018-19, GCISC provided responses to nine (9) NA/Senate starred questions and provided inputs (presentations/ briefs) for NA Standing Committee on Climate Change on the aspects of Climate Change, Agriculture and food security.

Annex-I

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

i. **Hashmi, M. Z., Masood, A., Mushtaq, H.**, Syed Ahsan Ali Bukhari, Burhan Ahmad, Adnan Ahmad Tahir, "Exploring climate change impacts during 1st half of the 21st century on flow regime of the transboundary Kabul River in the Hindukush region" **accepted for publication in the Journal of Water and Climate Change**.

ii. **Masood, A.**, Jarbou Bahrawi & Amro Elfeki, "Modeling annual rainfall time series in Saudi Arabia using first-order autoregressive AR(1) model", **Arabian Journal of Geosciences (2019)** 12:191 https://doi.org/10.1007/s12517-019-4330-3.

iii. **Ali, S.**, Eum, H. I., Jaepil, C., Li, D., Khan, F., Dairaku, K., & Fahad, S. (2019). Assessment of climate extremes in future projections downscaled by multiple statistical downscaling methods over Pakistan. Atmospheric Research.

iv. **Ali, S.**, Bushra Khalid, **Kiani, R. S.**, Romaisa Babar, Sana Nasir, **Rehman, N., Adnan, M., Goheer, M. A.**, (2019), "Spatio-Temporal Variability of Summer Monsoon Onset over Pakistan", Asia-Pacific J Atmos Sci (2019). https://doi.org/10.1007/s13143-019-00130-z.

v. **Dogar, M. M.** (2019). The Sensitivity of DTR to the Increased CO2 over Mid-latitude Semi-dry Regions, JOJ Horticulture and Aboriculture, 2(2), 001-007.

vi. **Dogar, M. M.**, Kucharski, F., Sato, T., **Mehmood, S.**, **Ali, S.**, Gong, Z., & Arraut, J. (2019). Towards understanding the global and regional climatic impacts of Modoki magnitude. Global and planetary change, 172, 223-241.

vii. **Dogar, M. M.**, & Sato, T. (2019). Regional Climate Response of Middle Eastern, African and South Asian Monsoon Regions to Explosive Volcanism and ENSO Forcing. Journal of Geophysical Research: Atmospheres.

viii. **Hassan, S. S., Ajmal, M., Khan, A. A., Goheer, M. A.,** Muhammad Shahzad Khattak, **Ali, S., Ijaz, M. and Adnan, M.,** (2019), "Multi-Criteria Decision Analysis for Flood Risk on the Chenab River", Weather Journal, https://doi.org/10.1002/wea.3490.

ix. A.Shakoor, Z.M.Khan, U.Umar Farid, M.Sultan, **Khan**, **A.A.,** I.Ahmad and M.Azmat. 2019. Groundwater Vulnerability Mapping in Faisalabad District Using GIS Based Drastic Model. Matec Web of Conferences 246, 01001

ISWSO.

x. Amin, M., **A.A. Khan**, A. Perveen, Z. Rauf, **Hassan**, **S.S., Goheer, M.A., and Ijaz, M.** 2019. Drought risk assessment: a case study in Punjab, Pakistan. Sarhad Journal of Agriculture. Sarhad Journal of Agriculture.

xi. T Qadir,K. Akhtar, **Ahmad, A.**, A.Shakoor,M. Saqib,S .Hussain and M.Rafiq. 2019. Wheat Production Under Changing Climate: Consequences of Environmental Vulnerabilities on Different Abiotic and Biotic Stresses. J. Glob. Innov. Agric. Soc. Sci., 2019, 7(1):7-17.ISSN (Online): 2311-3839; ISSN (Print): 2312-5225http://www.jgiass.com.

xii. H.Umar Farid, M. Zubair, Z. M. Khan, A. Shakoor, B. Mustafa, **Khan, A.A.**, M.Mubeen, M.N. Anjum, I.Ahmad.2019. Identification of Influencing Factors for Optimal Adoptability of High Efficiency Irrigation System (HEIS) in Punjab, Pakistan, Sarhad Journal of Agriculture. Sarhad Journal of Agriculture. June 2019, Volume 32, Issue 2, Page 539-549.

xiii. S.Hussain,*, **Khan, A.A.**, A. Shakoor, **Goheer, M. A.,** T. Qadir, M. Mujtaba and Z Hussain. 2019. Effect of Cold and Heat Stress on Different Stages of Wheat: A Review. J. Glob. Innov. Agric. Soc. Sci., 2018,6(4): 123-128.

xiv. **Masood, A.**, **M. Z. Hashmi**, **Mushtaq, H.**, 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.

xv. Abid, M.; Abid, Z., **Zafar, Q., Mahmood, S.** (2018), Detrimental Effects of Climate Change on Women, Earth Systems and Environment, Springer Journal. Volume 2, Issue 3, pp 537–551.

xvi. G.Habib and **A.Ahmad**. 2018. Assessment and Mitigation of Methane Emissions from Livestock Sector in Pakistan. Earth Systems and Environment: https://doi.org/10.1007/s41748-018-0076-4, Earth Syst Environ 2, 601–608.

6. Technical Research Reports:

i. Muhammad Arif Goheer & Muhammad Ijaz contributed to volume ix and v of Refinement to IPCC 2006 Greenhouse Gas Inventories Guidelines published by IPCC in 2019;

ii. GCISC research contribution to various chapters of Second National Communication. The effort was coordinated by Muhammad Arif Goheer on behalf of GCISC;

iii. Remote Sensing for Spatio-Temporal Mapping of Smog in Punjab and Identification of the Underlying Causes Using GIS Techniques (R- SMOG) published by FAO;

iv. Muhammad Zia-ur-Rahman Hashmi, Amjad Masood and Shahbaz Mehmood. GCISC Report: Shushghai-Zhendoli (S-Z) Hydropower Project - GLOF and Climate Change Risk and Vulnerability Assessment Study;

v. National Inventory Report (NIR) for the year 2014-15 of the Greenhouse Gas Inventory 2014-15 has been finalized;

vi. Project Technical Report CBA2017-04MY-Akbar ‘’Improving Skills for Promoting Sustainable Watershed Management Practices in South Asia’’. Report has been submitted to APN which is available online on APN website;

vii. External reviewer of the Chapter titled; “Disaster Risk Reduction and Increasing Resilience” of the Second Order Draft of ICIMOD-HIMAP;

viii. A short report prepared in the context of Pakistan’ Indigenous Mitigation Efforts to Reduce Carbon Emissions.

7. Scientific Contribution Presentations in International Conferences and Workshops:

i. Shaukat Ali, Junior Associate – 2019 in Abdus Salam International Centre for Theoretical Physics (AS-ICTP), 27 May-04 August 2019, Italy;

ii. Qudsia Zafar, Paper-writing Workshop on Analysis of CORDEX-CORE Climate Projections (smr 3282), 06-10 May 2019, Italy;

iii. Muhammad Ijaz, Workshop of the Asian Regional Group of the Partnership on Transparency in the Paris Agreement, 24-26 April 2019, Indonesia;

iv. Muhammad Arif Goheer, 1st Meeting of the Consultative Group of Experts (CGE), UNFCCC, 20-22 February 2019, Germany;

v. Muhammad Zia-ur-Rahman Hashmi, UIB-N Meeting for Enhancing Science Based Regional Cooperation, 17-18 January 2019, Nepal;

vi. Muhammad Adnan, IPCC Second Lead Author Meeting for 6th Assessment Report, 07-11 January 2019, Canada;

vii. Muhammad Amjad, IPCC Second Lead Author Meeting for 6th Assessment Report, 07-11 January 2019, Canada;

viii. Shaukat Ali, delivered a presentation on "Climate Risk and Vulnerability Assessment (CRVA) in Bajaur, Khyber, and Mohmand Agencies", at IPCC Sixth Assessment Report (AR6) meeting at Kuala Lumpur, Malaysia on 15-16 November 2018;

ix. Muhammad Arif Goheer participated in the 4th Lead Author Meeting (LAM4) of the 2019 Refinement to IPCC 2006 GHG inventory Guidelines organized by IPCC – 22-26 October 2018, Rome, Italy;

x. Muhammad Ijaz, Fourth Lead Author Meeting (LAM4) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 22-26 October 2018, Italy;

xi. Muhammad Ijaz, The Joint Scientific Advisory Panel (SAP) and Review Editors Meeting of the Sixth Global Environment Outlook (GEO-6); 07-09 October 2018, Egypt;

xii. Muhammad Arif Goheer, GHG Inventory Workshop Organized by UNFCCC, 20-24 August 2018, China;

xiii. Shahbaz Mehmood, 23rd Intergovernmental Meeting and Science Planning Group Meeting 11-12 July 2018, Thailand.

8. Scientific Contribution Presentations in National Conferences and Workshops:

i. Shahbaz Mehmood, delivered talk as resource person titled "Climate Change in Pakistan's Context" at Conference on Climate Change: An Existential Challenge for Pakistan, organized by The Pakistan Institute of International Affairs – Karachi, 3-4 May 2019;

ii. Muhammad Zia-ur-Rahman Hashmi, delivered talk as resource person at Conference on Climate Change: An Existential Challenge for Pakistan, organized by The Pakistan Institute of International Affairs – Karachi, 3-4 May 2019;

iii. Muhammad Arif Goheer participated in a workshop on Role of Media in Environment and Climate Change Reporting organized by Pak-EPA on 25 April 2019, Islamabad;

iv. Muhammad Arif Goheer moderated a session on AFOLU in NDCP Roadmap workshop organized jointly Ministry of Climate Change and NDC on 24, April 2019, Islamabad;

v. Amjad Masood-Guest Speaker in the Seminar on "Climate Change and Water Resources of Pakistan" at Department of Earth Sciences University of Sargodha-2 Apr 2019;

vi. Muhammad Arif Goheer-Delivered a session in one day National Seminar on "Food Security: Future Challenges" at NCRD-21 Mar 2019;

vii. Muhammad Arif Goheer delivered a presentation as a Keynote speaker on 'Climate Change Challenges to Agriculture & Food Security: Prospects of Climate Smart Agriculture' organized by University of Wah and Commonwealth on 11 March 2019 in Wah;

viii. Muhammad Zia-ur-Rahman Hashmi at LEAD-Pakistan delivered a presentation as Speaker for National Consultation on "Capturing Opportunities and Managing Challenges: Cooperating in the Kabul River Basin for Afghanistan-Pakistan Water Relations at Serena Hotel-26 Feb 2019;

ix. Muhammad Arif Goheer delivered a presentation on 'Climate Smart Agriculture: A Pathway to Food Security' in the training workshop on Food Security-Issues, Concerns & Strategies organized by AHK-NCRD on 30 January 2019, Islamabad;

x. Muhammad Arif Goheer-Delivered a Presentation on Proposal to combat water shortage through artificial rain technology at Federal Flood Commission by M/s Magnetic Technologies LLC-28 Jan 2019;

xi. Aftab Ahmad Khan represented GCISC in a workshop on 'Stakeholder Workshop on Climate Change Scenarios for KPK' Organized by CABI International, on 24 January 2019, Rawalpindi;

xii. Muhammad Arif Goheer participated in NDMA workshop organized by NDMA on 18 January 2019, Islamabad;

xiii. Muhammad Arif Goheer delivered a presentation in the R-SMOG report launch organized jointly by Punjab Agriculture Department and FAO on 17 January 2019, Lahore;

xiv. Muhammad Arif Goheer delivered a presentation in GCISC seminar on Towards Enhanced Climate Action Transparency Framework: Challenges & Opportunities for Pakistan on Being Elected as a Member of CGE in UNFCCC on 11 January 2019;

xv. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-Presentation in Meeting at GCISC on food-energy-water security early warning system project-17 Dec 2018;

xvi. Section Heads and GCISC Research Staff participated in Annual Conference organized by SDPI from 04-07 December 2018, Islamabad;

xvii. Muhammad Arif Goheer delivered a presentation on Climate Change challenges to Agriculture and Food Security in a training course on 'Climate Change Implications and Adaptations' Organized by AHK - NCRD, on 29 November 2018, Islamabad;

xviii. Shahbaz Mehmood, delivered a talk on "Science of Climate Change; an Overview & Climate of Pakistan and Future Climate Changes", at Training Course on Climate Change: Implications & Adaptations, 26 – 30 November 2018, NCRD, Islamabad;

xix. Muhammad Arif Goheer moderated a session on Agriculture, Forestry and Land Use Sector in the NDC Roadmap workshop organized jointly by Ministry of Climate Change and NDC Partnership on 26 November 2018, Islamabad;

xx. Aftab Ahmad Khan delivered a presentation on Spatio-Temporal analysis of Precipitation responses to Wheat crop in rain fed and irrigated units of District Lakki Marwat Using Google Earth Engine in National Conference on Agriculture problems and Food security in changing climate 15-17 November 2018, AUP Peshawar;

xxi. Aftab Ahmad Khan-Present paper in National Conference organized by University of Peshawar - 14-17 Nov 2018;

xxii. Amjad Masood-Participation as Guest Speaker and delivered a presentation in the 3rd International Conference on Emerging Trends in Engineering, Management & Sciences (ICETEMS) at KIU Gilgit-10-11 Nov 2018;

xxiii. Muhammad Arif Goheer participated in the workshop on Mapping and valuing Ecosystem Services and Prioritizing Investment in Catchment Management Organized by World Bank on 31 October 2018, Islamabad;

xxiv. Shahbaz Mehmood, delivered on "IPCC Special Report on the Impacts of Global Warming of 1.5°C – Key Messages" at Weekly GCISC Research Seminar, 12 October 2018, GCISC-Islamabad;

xxv. Muhammad Arif Goheer delivered a presentation on the chapters written by GCISC in the National Steering Committee of Second National Communication chaired by Secretary Ministry of Climate Change on 9 October 2018, Islamabad;

xxvi. Muhammad Arif Goheer, Shahbaz Mehmood and Aftab Ahmad Khan, delivered presentations titled "Past & Projected Climate Changes over Pakistan" in the context of Agriculture, Food Security & Climate Change at National Expert Meeting on Climate Change and Food Security, October 5 – 6, 2018;

xxvii. Muhammad Arif Goheer participated and delivered a presentation title "Climate Change Research in Pakistan" in the meeting organized by Planning Commission of Pakistan to finalize Climate Change research plan on 3 October 2018, Islamabad;

xxviii. Muhammad Arif Goheer delivered a lecture on "Agriculture & Climate Change" in Training at NIGAB, PARC Organized by PARC under HI-AWARE project on 13 September 2018, Islamabad;

xxix. Mubashar Dogar (2018)- GCISC weekly seminar presentation titled "Study of the Global and Regional Climate Impacts of ENSO Magnitude using ICTP AGCM", 09 September 2018;

xxx. Muhammad Arif Goheer delivered a presentation on Potential Greenhouse Gas Emissions from Agriculture Sector in a Training Workshop on Mitigation Analysis organized by NEECA, Ministry of Energy on 30 August 2018, Islamabad;

xxxi. Muhammad Arif Goheer delivered a presentation on Youth and Climate Change Research in a Roundtable on Youth and Climate Change organized by Sustainable Development Policy Institute on 28 August 2018, Islamabad;

xxxii. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood, delivered presentation titled “Overview of the Climate Profile and Climate Induced Disasters in Pakistan”, at GLOF-II Inception Workshop, 05 July 2018, MoCC-Islamabad.

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

i. GCISC organized a meeting to discuss and develop a project proposal on Early Warning system for Food, Energy and Water Security under climate Change on 17 December 2018, Islamabad;
ii. Muhammad Arif Goheer, Shahbaz Mehmood, Qudsia Zafar & Kaleem Anwar Mir participated in Results sharing workshop on R-Smog study jointly organized by GCISC and FAO on 29 October 2018, Islamabad;
iii. Muhammad Arif Goheer represented GCISC in the 6th meeting of National Climate Change Policy Implementation Committee on 17 October 2018, Islamabad;
iv. GCISC Organized a two-day workshop on climate change and food security in NARC from 5-6 October 2018;
v. Stakeholder meeting on Remote Sensing jointly organized by FAO and GCISC on 27 September 2018, Islamabad;
vi. GCISC organized a field visit to Gilgit to study on the Impact of Debris Cover Thickness and Temperature Variations on Glacier Melting in the Upper Indus Basin" from 17-30 Sep 2018;

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

i. Shaukat Ali, Junior Associate – 2019 in Abdus Salam International Centre for Theoretical Physics (AS-ICTP), 27 May-04 August 2019, Italy;
ii. Qudsia Zafar, Paper-writing Workshop on Analysis of CORDEX-CORE Climate Projections (smr 3282), 06-10 May 2019, Italy;
iii. Muhammad Ijaz, Workshop of the Asian Regional Group of the Partnership on Transparency in the Paris Agreement, 24-26 April 2019, Indonesia;

iv. Muhammad Arif Goheer, 1st Meeting of the Consultative Group of Experts (CGE), UNFCCC, 20-22 February 2019, Germany;

v. Muhammad Zia-ur-Rahman Hashmi, UIB-N Meeting for Enhancing Science Based Regional Cooperation, 17-18 January 2019, Nepal;

vi. Muhammad Adnan, IPCC Second Lead Author Meeting for 6th Assessment Report, 07-11 January 2019, Canada;

vii. Muhammad Amjad, IPCC Second Lead Author Meeting for 6th Assessment Report, 07-11 January 2019, Canada;

viii. Shaukat Ali, delivered a presentation on "Climate Risk and Vulnerability Assessment (CRVA) in Bajaur, Khyber, and Mohmand Agencies", at IPCC Sixth Assessment Report (AR6) meeting at Kuala Lumpur, Malaysia on 15-16 November 2018;

ix. Muhammad Arif Goheer participated in the 4th Lead Author Meeting (LAM4) of the 2019 Refinement to IPCC 2006 GHG inventory Guidelines organized by IPCC – 22-26 October 2018, Rome, Italy;

x. Muhammad Ijaz, Fourth Lead Author Meeting (LAM4) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 22-26 October 2018, Italy;

xi. Muhammad Ijaz, The Joint Scientific Advisory Panel (SAP) and Review Editors Meeting of the Sixth Global Environment Outlook (GEO-6); 07-09 October 2018, Egypt;

xii. Muhammad Arif Goheer, GHG Inventory Workshop Organized by UNFCCC, 20-24 August 2018, China;

xiii. Shahbaz Mehmood, 23rd Intergovernmental Meeting and Science Planning Group Meeting 11-12 July 2018, Thailand.

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

i. Muhammad Zia-ur-Rahman Hashmi- participation in Third Upper Indus Basin Network Pakistan Chapter (UIBN-PC) Meeting, and Dialogue on National Awareness and Advocacy on Water Energy and Food Nexus, organized by ICIMOD at Karakorum International University, Gilgit-27-28 Jun 2019;

ii. Amjad Masood-Participation in “Pakistan’s Climate Challenge; a talk on the evolving global framework on climate change” at Research Society of International Law (RSIL), Islamabad-27 Jun 2019;

iii. Muhammad Arif Goheer & Muhammad Amjad participation in SNC briefing to Advisor at Ministry of Climate Change-27 Jun 2019;

iv. Aftab Ahmad Khan participation in Seminar on Water Resources Modelling at Chairman Flood Commission Office, M/o Water Resources-27 Jun 2019;

v. Muhammad Arif Goheer participation in Meeting on Climate Change Risk on Agriculture with Kanji Advisory Firm MD- Inshan Ali Kanji Islamabad-26 Jun 2019;

vi. Muhammad Arif Goheer participation in Meeting on SNC at Advisor / Minister MoCC office-20 Jun 2019;

vii. Shahbaz Mehmood participation in PMD 7th Monsoon Forum at Avari Hotel Lahore-17 Jun 2019;

viii. Muhammad Zia-ur-Rahman Hashmi-Field visit to Study Sites in Quetta and its Surrounding, as part of the GCISC-BUITEMS Collaborative Project on “Climate Change Impacts and Adaptation in Balochistan”-17-20 Jun 2019;

ix. Muhammad Arif Goheer participation in Meeting of the National Assembly Standing Committee on Climate Change at Parliament House-30 May 2019;

x. Muhammad Zia-ur-Rahman Hashmi-Participation in seminar by Hungrian Team on Flood Management-27 May 2019;

xi. Muhammad Zia-ur-Rahman Hashmi participation in 5th Meeting of the Standing Committee On Water Resources at Committee Room No. 7 (Parliament House)-20 May 2019;

xii. Muhammad Arif Goheer participation in Meeting of the National Assembly Standing Committee on Climate Change at Committee Room of MoCC-20 May 2019;

xiii. Muhammad Zia-ur-Rahman Hashmi participation in 1st Meeting of Prime Minister’s Committee on Climate Change at the Prime Minister’s office-17 May 2019;

xiv. Muhammad Arif Goheer attended preparatory Meeting of the National Assembly Standing Committee on Climate Change-16 May 2019;

xv. Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood participated as a Guest Speaker in a 2-day Conference being organized by the Pakistan Institute of International Affairs (PIIA) at Karachi-3-4 May 2019;

xvi. Shahbaz Mehmood-Participated in NUST SCEE Open House-30 Apr 2019;

xvii. Muhammad Arif Goheer participated in a Meeting on Review the Progress on the Decisions of National Climate Change Policy Implementation Committee (NCCPIC)-29 Apr 2019;

xviii. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi, Shahbaz Mehmood, M Amjad, M Adnan & M Ijaz- Participation in Ministry of Climate Change / NDU, "Multi-Stakeholder Climate Forum" under Nationally Determined Contributions (NDC) Partnership's Technical Assistance to Government of Pakistan at Serena Hotel Islamabad-24 Apr 2019;

xix. Shaukat Ali & Mubashar Dogar- Participation in National Institute of Health, Lecture on Environmental Health at NIH-24 Apr 2019;

xx. Muhammad Arif Goheer- Participation in Pak-EPA / MoCC-Participation in Panel discussion Among Air Quality Experts – Earth Day at EPA Office-23 Apr 2019;

xxi. Shaukat Ali & Muhammad Adnan- Participation in Agha Khan University and LEAD Pakistan, Dissemination Seminar on "Preparing Communities and Hospitals for Heat Waves – Lessons Learnt from Karachi at Ramada Hotel Islamabad-19 Apr 2019;

xxii. Muhammad Zia-ur-Rahman Hashmi- Participated in Meeting of Standing Committee on Climate Change at MoCC-19 Apr 2019;

xxiii. Muhammad Arif Goheer- Participation in UNFCCC Consultative Meeting on Climate Change Issues at Ministry of Foreign Affairs-17 Apr 2019;

xxiv. Aftab Ahmad Khan-Participation in Field Assessment and Workshop under Balochistan Water Engagement in Balochistan- 11-16 Apr 2019;

xxv. Muhammad Arif Goheer-Participation in 5th meeting of NDMA and UN Strategic Coordination Forum – DM (SCF – DM)-11 Apr 2019;

xxvi. Muhammad Amjad-Attended a seminar on Managing Shared Basins Impact of Climate Change on Water Quality: A case study of the Kabul River Basin-11 Apr 2019;

xxvii. Muhammad Arif Goheer-Attended a briefing on smart water and flood management techniques scheduled by Federal Flood Commission office - 5 April 2019;

xxviii. Muhammad Arif Goheer participated in World Bank Consultative Session on Regional Study on Ambient Air Pollution on March 28, 2019, Islamabad;

xxix. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-IUCN – Attended a Joint Event of International Day of Forests & the World Water Day at Serena Hotel-22 Mar 2019;

xxx. Muhammad Arif Goheer-Attended a meeting on Clean & Green Pakistan Movement at MoCC-21 Mar 2019;

xxxi. Amjad Masood & Aftab Ahmad Khan-Participation in UNESCO sponsored International Water Technology Workshop (IWTW): Water-related Disaster Risk Reduction (DRR) at NUST-21-22 Feb 2019;

xxxii. Muhammad Arif Goheer participated in NDM SCF meeting organized jointly NDMA and UNOCHA on 7 February 2019 at UNOCHA office, Islamabad;

xxxiii. Aftab Ahmad Khan-Stakeholder workshop on climate change scenarios for KPK-24 Jan 2019;

xxxiv. Muhammad Arif Goheer-NDMA Meeting on Prevailing Drought Like Situation Across Pakistan-18 Jan 2019;

xxxv. Shahbaz Mehmood, Qudsia Zafar & Kaleem Anwar Mir-Participation in the R-SMOG project report launch event at Lahore-17 Jan 2019;

xxxvi. Muhammad Arif Goheer participated in the Science-Diplomacy meeting organized by Pakistan Foreign Office on January 16, 2019, Islamabad;

xxxvii. GCISC research staff participated in One day international conference on Climate Change at Bahria University-27 Dec 2018;

xxxviii. Muhammad Ijaz, Nuzba Shaheen & Aftab Ahmad Khan and Sher Shah Hassan-Training Workshop on Earth Observation Applications in Agriculture by PARC & ICIMOD at NARC-26-28 Dec 2018;

xxxix. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-Meeting at GCISC on food-energy-water security early warning system project-17 Dec 2018;

xl. Muhammad Arif Goheer-4th meeting of NDMA and UN Strategic Coordination Forum – DM (SCF – DM) at Serena Business Complex-11 Dec 2018;

xli. Muhammad Arif Goheer, Shahbaz Mehmood, M Amjad, Syed Raheel Haider & Saqib Mushtaq-SDPI's Eleventh South Asia Economic Summit at Margala Hotel-4-7 Dec 2018;

xlii. Muhammad Ijaz-Participation in National Consultation on Pakistan at Global Warming of 1.5-2 C: Capturing opportunities and Managing challenges by LEAD-30 Nov 2018;

xliii. Shahbaz Mehmood, Muhammad Adnan, Muhammad Amjad & Muhammad Ijaz-National Consultation on Pakistan at Global Warming of 1.5- 2°C: Capturing Opportunities and Managing Challenges at Islamabad Club-30 Nov 2018;

xliv. Muhammad Arif Goheer- Participated in AHK National Centre for Rural Development (AHKNCRD) Training Course on "Climate Change: Implications & Adaptations", from 26-30 November 2018, Lecture on Climate Change and Agriculture-29 Nov 2018;

xlv. Muhammad Zia-ur-Rahman Hashmi-Upper Indus Basin (UIB) Network, Pakistan Chapter Meeting at PGRI Building, NARC, Park Road, Islamabad-29 Nov 2018;

xlvi. Shahbaz Mehmood-AHK National Centre for Rural Development (AHKNCRD)Training Course on "Climate Change: Implications & Adaptations", from 26-30 November 2018, Lecture/Talk on Climate Change: Science and implications for Pakistan'-27 Nov 2018;

xlvii. Muhammad Arif Goheer, Shahbaz Mehmood, Muhammad Ijaz & Kaleem Anwar Mir-Ministry of Climate Change / NDC Partnership Workshop on Pakistan's Nationally Determined Contributions: Way forward for implementation of climate action at Hill View Hotel Islamabad-26 Nov 2018

xlviii. Shahbaz Mehmood-Participated in 5th Stakeholder Meeting at NUST-14 Nov 2018;

xlix. Amjad Masood-Participation as Guest Speaker in the 3rd International Conference on Emerging Trends in Engineering, Management & Sciences (ICETEMS) at KIU Gilgit-10-11 Nov 2018;

l. Muhammad Arif Goheer, Shahbaz Mehmood, Qudsia Zafar & Kaleem Anwar Mir-Research Sharing Workshop for the TCP Project (R-SMOG)-29 Oct 2018;

li. Shahbaz Mehmood, Kaleem Anwar Mir & Qudsia Zafar-Result sharing

workshop "Remote sensing for spatio-temporal mapping of Smog in Punjab and identification of the underlying causes using GIS Techniques (R-SMOG) by FAO-29 Oct 2018;

lii. Muhammad Zia-ur-Rahman Hashmi attended 6th Meeting of the National Climate Change Policy Implementation Committee (NCCPIC) under the Chairmanship of Advisor to the Prime Minister on Climate Change at MoCC-17 Oct 2018;

liii. Muhammad Arif Goheer-Meeting of National Project Steering Committee of the 'Proposed Design and Evaluation of Carbon Pricing Instruments for Pakistan-11 Oct 2018;

liv. Muhammad Zia-ur-Rahman Hashmi-Meeting of Working Group on Science & Technology for Preparation of the 12th Five Year Plan (2018-23)- 09 Oct 2018;

lv. Muhammad Arif Goheer, Aftab Ahmed Khan-UNESCO – Participated and delivered presentation on "Climate Change and Food Security Issues in Pakistan" in Two Day National Expert Meeting on Climate Change and Food Security at NARC- 05-06 Oct 2018;

lvi. Muhammad Arif Goheer- Meeting at Planning Commission, State of Scientific Research on Climate Science and 12th Five Year Plan- 03 Oct 2018;

lvii. Muhammad Arif Goheer, Shahbaz Mehmood, Qudsia Zafar & Kaleem Anwar Mir participated in a meeting on R-SMOG at FAO Office in NARC-27 Sep 2018;

lviii. Muhammad Arif Goheer- Attended a meeting at MoCC on NDC Support to Pakistan-27 Sep 2018;

lix. Shaukat Ali-Field visit to Gilgit under project "Studies on the Impact of Debris Cover Thickness and Temperature Variations on Glacier Melting in the Upper Indus Basin" - 17-30 Sep 2018;

lx. Muhammad Arif Goheer-Participated and delivered a Lecture on Agriculture & climate Change, Training at PARC-13 Sep 2018;

lxi. Qudsia Zafar-Participated in training course on Drought Management at Pakistan Academy of Rural Development (PARD), Peshawar-6-10 Aug 2018;

lxii. Muhammad Arif Goheer-Attended Inter-Ministerial Meeting on Tackling the SMOG Issue at Ministry of Foreign Affairs-7 Aug 2018;

lxiii. Shahbaz Mehmood-Attended a Two Day National Expert Meeting on Climate

Change and Food Security- July 2018;

lxiv. Amjad Masood-Open house at Institute of Space Technology (IST)-11 Jul 2018;

lxv. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-Participated in Inception workshop on GLOF-II Project by MoCC & UNDP-3-5 Jul 2018;

lxvi. Muhammad Adnan- Participated in Workshop on "Socio-economic impact assessment of CPEC Interventions" by Centre of Excellence CPEC at PIDE-3 Jul 2018.

12. Contributions to Research Projects:

i). R-SMOG (2018). TCP (Technical Cooperation Programme) Project between Food and Agriculture Organization of the United Nations (FAO) and Global Change Impact Studies Centre (GCISC), Ministry of Climate Change on "Remote sensing for Spatio-temporal mapping of smog in Punjab and identification of the underlying causes using GIS techniques (R-SMOG)";

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

iii). 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;

iv). FAO: Development of Food Security and Nutrition Information System (FSNIS)/Food Security Monitoring System (FSMS) for Pakistan;

v). FAO: Transformation of the Indus Basin with the Introduction of Climate Resilient Agriculture and Sustainable Water Management;

vi). APN: Climate smart agriculture through sustainable water use management: Exploring new approaches and devising strategies for climate change adaptation In South Asia.

13. Mass Awareness / Media Appearance:

i. GCISC scientists published Six **(06)** news articles in various leading national newspaper;

a. The importance of COP24, Published on December 25, 2018 in The News
b. The climate clock, Published on October 27, 2018 in The News
c. The climate conundrum, Published on July 25, 2018 in The News
d. How healthy are glaciers in Pakistan? Published on 16 December 2019 in The Express Tribune
e. Opportunities and challenges of Pakistan's massive afforestation drive Published on 5 February 2019 on www.thethirdpole.net
f. Water and peace, Published on 17 October 2018 in The News

ii. An exclusive program to highlight the climate change and associated impact was broadcasted on PTV world in which GCISC Scientists highlighted the implications of Climate Change.

iii. Muhammad Arif Goheer-Participation in Live Radio Pakistan Programme on Environment & Agriculture Base-26 Sep 2018;

14. Capacity Building:

- Provided trainings to following BS/MS level students from various universities under GCISC Internship Program.
  - Ms. Saima Lateef d/o Malik Abdul Lateef student of Bachelor of Environmental Sciences, Bahria University Islamabad.
  - Ms. Aleena Nazir d/o Muhammad Nazir student of Bachelor of Environmental Sciences, Bahria University Islamabad.
  - Mr Mubeen Shafqat S/o Shafqat Rasul student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
  - Mr Haseeb Muneer Asam S/o Muneer Ahmed Asam student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
  - Ms. Hamna Khurshid d/o Muhammad Khurshid student of Bachelor of Engineering in Geo-Informatics, Institute of Geographical Information Systems (IGIS) NUST, Islamabad.
  - Ms. Sidra Nadim d/o Muhammad Nadim Ahmad student of Bachelor of Engineering in Geo-Informatics, Institute of Geographical Information Systems (IGIS) NUST, Islamabad.

- Ms. Nazia Parveen d/o Safdar Khan student of Bachelor of Geo-informatics & Remote Sensing, PMAS Arid Agriculture University Rawalpindi.
- Ms. Kaenat Gul d/o Umer Gul student of Bachelor of Geo-informatics & Remote Sensing, PMAS Arid Agriculture University Rawalpindi.
- Ms. Mahnoor Waqar d/o Khawaja Waqar Ahmed student of Bachelor of Geo-informatics & Remote Sensing, PMAS Arid Agriculture University Rawalpindi.
- Mr Muhammad Usama Zaheer S/o Zaheer Ahmad student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Mr Muhammad Haris Rehman S/o Muhammad Qurban student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Mr Mubashir Ali S/o Muhammad Akhtar Hussain student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Mr Muhammad Hamza Dar S/o Sajid Mahmood Dar student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Ms Tooba Amjad d/o Amjad Ali Qureshi student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Ms Safa Arif d/o Arif Baig student of Bachelor of Geo-Informatics, PMAS-Arid Agriculture University Rawalpindi.
- Ms Zainab Asad d/o Asad Ullah student of Bachelor of Agricultural Engineering, University of Engineering & Technology (UET) Peshawar.
- Mr Asif Rehman d/o Ghani Ur Rehman student of Bachelor of Agricultural Engineering, University of Engineering & Technology (UET) Peshawar.
- Mr Muhammad Haris d/o Mukhtiar Ali student of Bachelor of Agricultural Engineering, University of Engineering & Technology (UET) Peshawar.

15. Organization of Seminars:

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

i. GCISC's contribution in the 'Balochistan Water Engagement - Leaving No One Behind', Aftab Ahmad Khan, Scientific Officer, GCISC- 26 April 2019;
ii. Climate Adaptation Governess and Role of Sub National Governments, Dr Muhammad Mumtaz, Sao Paulo School of Management (EAESP), Brazil- 19 April 2019;
iii. In Hydropower relevant to the National Grid in the age of declining VRE Cost, M Waqar Ahmed Khan, CEO of Star Hydro Power Limited- 12 April 2019;
iv. Future Projections of Head Waves in Pakistan Using Ensemble NEX-GDDP Data Set, Jahangir Ali, Researcher- 29 March 2019;
v. Effective Proposal Writing for Securing Research Funding, Dr Attiq Ur Rahman, Project Management Consultant- 22 March 2019;
vi. Research in the Age of Adaptation, Dr Adil Najam, Inaugural Dean of the Frederick S. Pardee School of Global Studies at Boston University- 15 March 2019;
vii. Report on progress of the CGE Meeting at UNFCCC Office Germany, Muhammad Arif Goheer, Head Agriculture & Coordination, GCISC- 08 March 2019;
viii. Approaches for 1.5 Degrees: Which path to Halting Climate Change, Muhammad Amjad, Senior Scientific Officer, GCISC- 08 February 2019;
ix. The upcoming UN Environment's Global Environment Outlook 6 (GEO6) Report, History, Assessment & Review Process, Muhammad Ijaz, Senior Scientific Officer, GCISC- 25 January 2019;
x. Towards Enhanced Climate Action Transparency Framework: Challenges & Opportunities for Pakistan on Being Elected as a Member of CGE in UNFCCC, Muhammad Arif Goheer, Head Agriculture & Coordination, GCISC- 11 January 2019;
xi. Glacial Lake Outburst Floods: Threatening the Livelihood of Mountain Communities in Northern Pakistan, Imran Khan, Research Associate, Social Development, Islamabad- 04 January 2019;
xii. Spatio-temporal Assessment of Precipitation Responses to Vegetation Indices and crop yield in an irrigated and Rain Fed Unit Using Google Earth Engine, Aftab Ahmad Khan, Scientific Officer, GCISC- 07 December 2018

xiii. How the Monsoon Rainfall over Pakistan is Different from the Main South-Asian/ Indian Summer Monsoon, Dr Faisal Saeed, Climate Expert, Pakistan Meteorological Department, Islamabad- 30 November 2018;

xiv. Importance of Science Education and Research According to the Teaching of Prophet Muhammad (PBUH), Hafiz Masood Alvi, Dars E Nizami Graduate- 16 November 2018;

xv. Remote Sensing of Air Pollution that people can see: A Bulging Challenge in Big Cities under Climate Change, Dr Imran Shahzad, Associate Head, Department of Meteorology, Comsats University, Islamabad- 09 November 2018;

xvi. Human Faces of Climate Change, Laila Kiran, Filmmaker-Researcher, Climate Impacts- 26 October 2019;

xvii. Fate of Future Food Security of Pakistan Under Warming Extremes, Nuzba Shaheen, Senior Scientific Officer, GCISC- 19 October 2019;

xviii. IPCC Special Report on the Impact of Global Warming of 1.5 C - An Overview, Shahbaz Mehmood, Head Climatology, GCISC- 12 October 2019;

xix. Impact of Debris Cover on Glacier Melting in Karakoram, Shaukat Ali, Senior Scientific Officer, GCISC- 05 October 2019;

xx. Educational Reforms Needed to Address Modern Era Challenges Including Climate Change, Umair Qureshi, CEO, Leader in Edu & Academic Development (Pvt) Ltd.- 28 September 2018;

xxi. Emission Picture of Pakistan's Agriculture: Historical Trends and Baseline Projections Under Food Security Scenarios, Muhammad Ijaz, Senior Scientific Officer, GCISC- 14 September 2018;

xxii. Study of the Global and Regional Impacts of EL-NINNO Oscillation Magnitude Using ICTP AGCM, Mubashar Dogar, Scientific Officer, GCISC- 07 September 2018;

xxiii. IPCC-AR6 WG-I-Recent Lead Author Meeting: Overview and Progress, Muhammad Adnan, Statistical Climatology Researcher at GCISC- 31 August 2018;

xxiv. GCISC's participation in the 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 (CPEC)",

Muhammad Zia-ur-Rahman Hashmi, Head Water Resources & Glaciology, GCISC- 17 August 2018;

xxv. IPCC First Lead Author Meeting - AR6 WGI - Challenges in Assessment, Mr. Muhammad Amjad, Senior Scientific Officer, GCISC- 10 August 2018;

xxvi. Country level quantification of GHGs emissions: Training Programme in Korea: Proceedings, Lessons learnt for Pakistan and Invaluable Moments, Engr. Kaleem Anwar Mir, Scientific Officer, GCISC- 03 August 2018;

xxvii. Atmospheric composition, data assimilation and climate change, Dr. Faheem Khokhar, IESE-NUST- 27 July 2018;

xxviii. Comparison between statistical and dynamical downscaling of rainfall under Representative Concentration Pathways scenarios over the Gwadar-Ormara basin, Pakistan, Engr. Raazia Attique, M.Sc Geo-Information Sc. and Earth Obs. with specialization in Water Resources and Environmental Management- 13 July 2018;

xxix. Water Resources and Food Production in the Basins of the Hindu-Kush Himalaya (HKH): Quantification of Critical Moments and Adaptation Turning Points" (A component of the HI-AWARE Project), Qurat ul Ain Ahmad, Senior Scientific Officer-GCISC, Ph.D candidate at the Wageningen University, Netherlands- 06 July 2018.

16. Other Important Assignments:

General Administrative/ Technical Functioning:

- Provision of Scientific assistance to Ministry of Climate Change and other Government Departments regarding Climate Change assessment impacts etc. on as and when desired basis;
- Vetting/ approval process of Draft Employees Service Rules for GCISC is under process at Finance Division. GCISC's views on some critical observations were conveyed in a meeting with Finance Division held on 17 May 2019 for further action by Finance Division;
- 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.

17. Collaborative Climate Change Related Research Studies:

(a) University Consortium:

TITLE OF STUDY	INSTITUTION
Identification of shifts in cropping patterns under 2 °C scenario	UAF-USPCAS-AFS
Obstacles to the adoption of climate friendly technologies in the farmer fields and possible solutions	UAF-USPCAS-AFS
Renewable Energy Technology Manufacturing Status in Pakistan and Future Road Map for Global Competitiveness	NUST
Quantification of the Impact of Climate Change on Electric Power Sector of Pakistan	NUST
Prospects of Renewable Energy in Pakistan to Meet INDC Commitments	NUST
Coping with the reducing water availability in the Indus Basin of Pakistan through changes in the Cropping Pattern	PCRWR
Re-allocation of water allowance in the irrigated area of Indus Basin under changing cropping pattern and climate	PCRWR
Energy Efficiency in Public Transport for City of Karachi, Pakistan	NED KHI
A Strategy of Enabling Pakistan's Construction Industry to Climate Friendly Buildings	NED KHI
Climate Change Impacts on the local Ecosystems of Kashmir Himalayas	University Of AJ&K
Hydrological information collection for improved agricultural water management as an enabler for broader climate informatics	LUMS
Assessment of Climate Change Impacts on rain-fed cropping systems under 2 °C scenario	PARC

Assessment of Climate Change Impacts on insect-pest proliferation in cotton-based cropping systems of Pakistan	PARC
Assessment of Climate Change Impacts on livestock production, adaptation and mitigation strategies	PARC
Climate Change and Future Climate Extremes & Rainfall Variability	PMD
Cost and benefit analysis of the Indus water supply to Quetta project	BUITEMS
Future drought risk and adaptive capacity in Balochistan (including role of 100 dams project and CPEC)	BUITEMS
Groundwater management and solar energy nexus in Balochistan	BUITEMS
Spatio-temporal analysis of variation in soil salinity levels in the Indus delta using field and remote sensing data	MUET
Developing a linkage/relation of the current soil salinity profiles (observed spatially and vertically using state of the art field equipment/instruments) with the changes in freshwater supplies downstream of Kotri	MUET
Coastal area inundation under different sea level rise scenarios and estimation of associated environmental/economic loss	MUET
Study on the potential distribution of tree species and shifting of the tree species lines based on future climate change scenarios	IST
The health impacts of heatwaves over different regions of Pakistan / identification of vulnerable regions in Pakistan to heatwaves	NIH
The impacts of future climate changes in temperature on the movement of disease vector	NIH
To evaluate the health vulnerability to climate change and capacity of the public health system to cope with epidemics	NIH
Impact of debris cover thickness and temperature variations on glacier melting (in relation to Karakoram Anomaly) in the Upper Indus Basin	YU
Prospects of crop production in the mountainous ecosystems under changing climate	KIU
Climate induced disasters: community-based response to GLOFS	KIU

Spatiao-temporal dynamics of greenhouse gas emissions from soils under various forest types of Pakistan	PMAS-UAAR
Development of database to submit Forest Reference Emission Levels (FRELs) for implementing REDD+ in Pakistan	PMAS-UAAR
Mobilizing climate finance for Pakistan's development agenda	PIDE
Payments of ecosystem services (for global. Regional and local scale) for KPK forests	PIDE
Assessment of Climate Change Impacts on wheat-rice and wheat-Miscellaneous cropping systems under 2 °C scenario	UAF
Assessment of Climate Change Impacts on high value crops under 2 °C scenario	UAF
Technical Manual on Climate Change Education and Awareness	SDPI
Linkages of climate change, ELAs and Zero-Degree isotherms in the Karakoram Himalayas (selected basins)	UET Peshawar

(b) GCISC Senior Fellows:

S#	NAME	AFFILIATION	EXPERTISE	Research Study
1	Professor Sajjad Ahmad	University of Nevada, Las Vegas, USA	Integrated Water Resource Management	Climate change impact on Pakistan's groundwater availability
2	Professor Saleem Hassan Ali	University of Delaware, USA	National Resources	Sustainable Mining
3	Professor Steve Burian	University of Utah, USA	Climate Impacts	Upper Indus Water Resilience Under Climate Change Scenarios
4	Dr. Tom Downing	President and CEO Global Climate Adaptation Partnership, Oxford, UK	Climate Adaptation Modeling	Climate change adaptation in the irrigated farming region of Indus Basin
5	Professor Rick Forster	University of Utah, USA	Glaciology	High Elevation climate change and its impact on UIB cryosphere
6	Professor Adil Najam	Boston University, USA	Climate Change and Sustainable Development	Status of Climate Change in Pakistan; Science's message to policy makers
7	Dr. Youba Sokona	South Centre, Geneva, Switzerland	Climate Change and Energy Systems	Climate change and energy systems
8	Dr Saleemul Huq	Director, International Centre for Climate Change & Development (ICCCAD), Bangladesh	Climate Change Adaptation	Bridging Climate action and Sustainable Development Goals
9	Professor Asim Zia	University of Vermont, USA	Climate Policy	Early Warning Systems for Food, Water and Energy in Indus Basin

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iv. Islamabad Wildlife Management Board (IWMB)

1. INTRODUCTION

The Federal Government had issued the Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance, 1979 (Ordinance) to protect the wildlife and environment in the Islamabad capital territory (ICT). As provided for in the Ordinance, the government notified the Margallah Hills National Park (MHNP) in 1980. The park covered an area of 67 sq. miles and included the Margallah Hills in the Islamabad capital territory, as well as the Rawal Lake and Shakarparian areas. As also provided for the Ordinance, the federal government notified a Wildlife Management Board in 1981. The Board was chaired by the Chairman CDA and included officials of CDA as well the federal government. *The Board remained dysfunctional and never met, and the CDA continued to manage the MHNP through its Environment Directorate without the oversight and direction from the Board as provided for in the law*.

On September 30, 2014, Prof. Z B Mirza, a prominent zoologist and field expert, filed a petition in the Islamabad High Court (IHC) maintaining that the MHNP was facing severe degradation due to lack of attention from CDA.

The Cabinet Division held a meeting with the petitioner, members of the Committee, and the CDA to solicit their views on the constitution of the Board, and forwarded its recommendations to the federal government. The Board was finally notified by the federal government on July 7, 2015. Thereafter via a Cabinet Division notification No. 6/9/2015-CDA-II dated August 10, 2015 Dr. Anis-ur-Rahman was appointed Chairman of the Board with immediate effect till further orders.

After its declaration as a protected area in 1980, the Margallah Hills National Park was managed by the Capital Development Authority (CDA). However, in 2015, the Islamabad Wildlife Management Board (IWMB) was set up under Section 4 of the Islamabad Wildlife (Protection, Preservation, Conservation and Management Ordinance 1979, Government of Pakistan). The Board was officially notified on 7th July 2015 by the Prime Minister of Pakistan.

The IWMB is the legal custodian of the Park and involved in protection, conservation and management of the Margalla Hills National park. The aim is to minimize anthropogenic

impacts on the ecological resources of the national park through a park protection programme from threats such as illegal extraction of park wood, exploitation of wildlife species, forest fires, illegal construction and encroachment. In addition, the IWMB is working with the local communities of the Park to raise their environmental awareness, educate them and improve their living conditions.

The Islamabad Wildlife Management Board is in the process of building capacity to fulfill its mandate for management of wildlife in the Islamabad Capital Territory. The IWMB has the following objectives:

- To protect and manage Islamabad's unique and outstanding natural beauty for generations to come, through international standards while engaging local communities
- To preserve, protect and enhance the indigenous flora and fauna (biodiversity) in Islamabad and create open space to enrich the quality of life for present and future generations in a safe and secure environment.
- Management and Control the illegal trade of wildlife species in ICT.
- Development and maintenance of physical infrastructure inside the MHNP such as roads and buildings. Consistent with legislation, all plans related to roads and buildings need to be shared and approved by the IWMB before implementation.

2. MARGALLAH HILLS NATIONAL PARK:

Margallah Hills National Park lies adjacent to the capital city of Islamabad. To the northwest is the incipient industrial center of Taxila. Encroachments from these urban areas pose serious threats to the integrity of the wilderness of the Park. However, the foremost and most serious threat to the Park is from the communities living inside the Park which have increased in population over the years. These local communities allow their livestock to graze freely and this destroys the vegetation cover and tramples young seedlings. In addition, the locals cut tress for fuel, gather fodder for their animals, and divert natural water streams to cultivated plots near their homes. Some residents even hunt native animals such as hares and birds for food and sport. Solid and liquid waste is not disposed of adequately with consequent negative impacts for the environment and ecological resources.

There are a number of rock mining quarries in the Park where the habitat is severely degraded. Quarries operate on lease arrangements made by the Planning Directorate of the CDA. Some leases were granted after the park was established but public pressure brought mainly by a citizen's group "*The Margalla Hills Society*", forced the termination of such leases. The CDA ordered the closure of all mines on 31 July 1991. Most of the quarries have discontinued operations and others are expected to be closed in the near future. The Fecto Cement company's 30-year lease for mining limestone, granted in 1983 is however, not included in this order.

Fires are a fairly common occurrence in the Margalla Hills and require significant expenditure and manpower to extinguish. Eighty-five per cent of these fires occur during the dry May-June period preceding the monsoon rains. The number of fires averaged 43 per year between 1986 and 1991. Most of the fires occur on the upper slope or ridge top sites on southern aspects and tend to be manmade.

Alien invasive vegetation species out compete native species and grow at an alarming rate, negatively impacting the delicate balance of the park ecosystem. The unscientific introduction of exotic vegetation like Paper Mulberry, *Parthenium Spp.* and *Lantana Spp.* has not only impacted the vegetation balance but also led to an increase in incidence of allergies.

2.1 AREA:

The Margallah Hills National Park (MHNP) is located in the foothills of the Himalayan range. It contains the hill ranges immediately to the north of the Federal Capital of Islamabad and the adjacent areas of the Rawal Lake and Shakar Parian Hills. The geographical coordinates of Margallah Hills and Rawal Lake are 73°7'3.32"E, the geography of the area is rough, with several valleys and numerous steeps. The climate and terrain of the area are excellent for hiking. The best season for the activity is February to April.

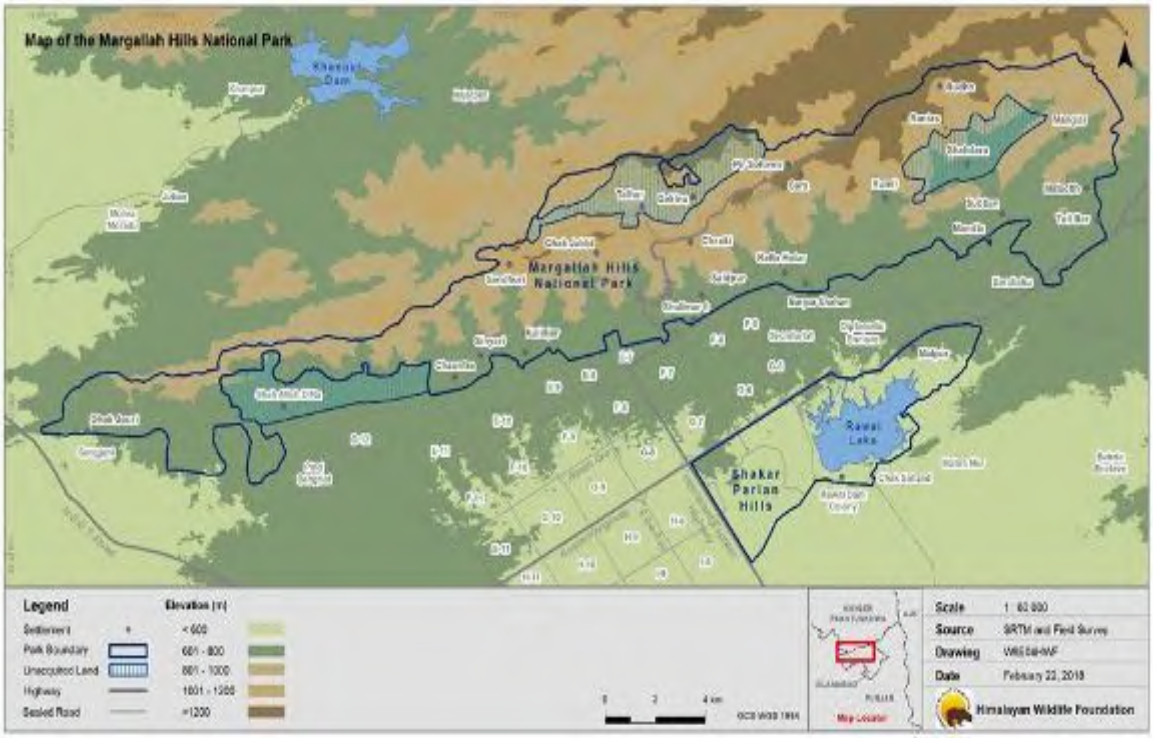
The Margalla Hills range between 456 m and 1,580 m in altitude. The topography is rugged, with numerous valleys and steep slopes. Rocks have been observed to date back to the Jurassic and Triassic ages, limestone being characteristic of the region (though shale, clay, and sandstone are also present). Soils are dark, with a high mineral content, and are capable of supporting good tree growth despite being shallow. The hills are an extension of the Himalayan

range and form the northern boundary of the Potohar plateau. The area is drained by the River Kurang and its tributaries, which flow into the Soan River.

The climate is subtropical semi-arid. The region lies in the monsoon belt and experiences two rainy seasons. Winter rains last from January until March, and summer rains from July to September. Temperatures range from 1-15 °C in winter and 20-40 °C during the summer. Annual average rainfall is 1,000 mm. There have been occasional incidents of light snowfall in severe winters.

There are at least 38 species of mammals, 218 species of birds reported from the Margalla Hills Range within the MHNP. Out of these, 82 resident, 32 summer visiting and breeding species, 73 winter visitors, and 31 transit migrants have been reported. There are 32 species of reptiles and 9 species of amphibians reported in this park.

Map of Margalla Hills National Park



3. GOVERNING BODY:

In pursuance of approval of the Prime Minister, conveyed vide Prime Minister's Office No. 2426/SPM/2015 dated 03.08.2015, Dr. Anis-ur-Rahman, Himalayan Wildlife Foundation (HWF) was appointed as the Chairman of the Islamabad Wildlife Management Board and in exercise of the powers conferred by section 4 of the Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance, 1979 (LXX of1979) read with sub rule (a) of rule 2A of Islamabad Wildlife (Protection, Conservation and Management) Rules, 1983, Federal Government reconstituted a Board of Wildlife Management on July 7, 2015 consisting of the following members, namely

3.1 EX.OFFICIAL MEMBERS

01.	Representative of Minister-in-charge of the cabinet division	Member
02.	Mayor of ICT Metropolitan Corporation.	Member
03.	Chairman- CDA	Member
04.	Member, Environment, CDA, Islamabad	Member
05.	Inspector General of Forest & Wildlife, Ministry of Climate Change, Islamabad	Member
06.	Secretary, Wildlife Department, Government of the Punjab.	Member
07.	Secretary, Environment (Wildlife) Department, Government of the Khyber Pakhtunkhwa.	Member

3.2 NON-OFFICIAL MEMBERS:

08.	Dr. Tariq Fazal Ch., MNA	Member
09.	Maryam Aurengzeb, MNA	Member
10.	Mushahid Hussain Syed, Senator	Member
11.	Dr. Zahid Baig Mirza, Biodiversity Specialist	Member
12.	Mr. Aitzaz-ud-din, Margalla Hills Society	Member
13.	Mr. Vaqar Zakria, Himalayan Wildlife Foundation	Member
14.	Dr.Anis-ur-Rehman, HWF	Member
15.	Dr. Ghulam Akbar, WWF	Member
16.	Dr. Tariq Hassan, Advocate Supreme Court	Member

3.3 ORGANIZATIONAL STRENGTH:

The IWMB has a team of 26 members that are working for the conservation and protection of wildlife species and National Park in Islamabad. The detail of strength is given below;

Sr.#	Designation & Scale	Strength
01.	Manager Operations (BPS-18)	01
02.	Assistant Director (Information & Outreach) (BPS-17)	02
03.	Assistant Director (Community Relations) (BPS-17)	02
04.	Assistant Director (Accounts & Finance) (BPS-17)	01
05.	Admin Officer (BPS-16)	01
06.	Assistant (BPS-15)	01
07.	Wildlife Guard (BPS-07)	14
08.	Wildlife Watcher (BPS-05)	02
09.	Peon (BPS-02)	02
Total		**26**

3.4 COMMITTEES IN IWMB:

The IWMB has 5 Committees, Protection Committee, and Scientific committee, Legal Committee, HR Committee, Accounts and Finance Committee. Each committee has a chairman and three members who look after their respective tasks.

3.4.1 Protection Committee:

Protection committee chaired by Mr. Rab Nawaz (WWF-Pakistan) is involved in making policies and plans for the protection of the wildlife and Margalla Hills National Park in Islamabad. Protection committee of IWMB stopped the illegal activities in the park. The guards of IWMB are involved in the routine patrolling from Margalla road to the top of the Monal, they look for the encroachment, illegal hunting, illegal trading, poaching, wood cutting etc.

3.4.2 Scientific Committee:

Scientific Committee chaired by Professor Zahid Baig Mirza (Biodiversity Specialist) is involved in drawing plans and policies for carrying out the researches and scientific studies in

the MHNP. The Scientific Committee of IWMB has initiated the camera trap study to know about the mammalian fauna of the park, Grey Goral study to know about the Grey Goral in the park, the area of the Park was searched for many days for any signs of Grey Goral, however no direct observation or any signs could be seen. MHNP Flora Study has initiated in Margalla Hills National Park to know about the vegetation and plant species of the park.

3.4.3 Legal Committee:

Legal committee chaired by Dr. Tariq Hassan (Advocate Supreme Court) looks after the legal issues of the board. Legal committee of IWMB has drafted the new Islamabad wildlife Protection, Preservation, Conservation and Management Rules 2018 and has approved it in the Board meeting and the new drafted rules are submitted in the Capital Administration and Development Division for approval.

3.4.4 HR Committee:

HR committee of IWMB chaired by Mr. Vaqar Zakaria (Himalayan Wildlife Foundation) has drafted the recruitment and service rules for the employees, these rules are approved in the Board meeting and are submitted to the CA&DD for the approval.

3.4.5 Accounts and Finance Committee:

The committee chaired by Mr. Vaqar Zakaria (Himalayan Wildlife Foundation) makes the budgets and accounts related tasks of the IWMB. The committee has approved its Accounting procedures and has opened the bank account in the name of Islamabad Wildlife Management Board. The committee reviews the accounts on quarterly basis before submission to the CA&DD and AGPR for the next installment.

3.4.6 Number of board meetings:

Following Board meetings were held during the Year 2018-2019

Meeting No	***Date***	***Venue***
14	20-July-2018	Conference Room, CA&DD, D- Block, Pak- Secretariat

Meeting No	*Date*	*Venue*
15	17-Sep-2018	Visitor Information Centre, Trail 5, MHNP
16	28- Jan-2019	IWMB Conference Room, Dino Park, Islamabad
17	14-June-2019	IWMB Conference Room, Dino Park, Islamabad

4. ACTIVITIES FOR CONSERVATION AND PROTECTION:

4.1 Protection of the Park

Private settlements, quarries, construction of roads, water contamination and introduction of exotic plant species are some of the factors affecting biodiversity in Margalla Hills National Park (MHNP).

"Illegal construction and encroachments by individuals and private housing societies, quarries and cutting of trees are not only disturbing the ecological system, but also robbing MHNP of its natural beauty," The Margalla Hills National Park was transferred to the Islamabad Wildlife Management Board after its formation on July 7, 2015 and the Board is the legal custodian of the National Park. Currently 24 protection staff members are involved in looking after 12 valleys, trails and features of MHNP. Currently overall Protection is being conducted in following five methods

- Patrolling by Guards in their assigned areas
- Patrolling by supervisors
- Joint patrolling with Pakistan Navy staff
- Intelligence based raids/operations
- At random Field visits by Protection officer

2 x dedicated guards have been assigned for intelligence gathering in order to ensure following,

- Keep an eye on encroachments, wood cutting, pouching, hunting and forest fire.
- Randomly check presence of field guards in their respective area
- Check violations by any and report in time

- Report fire incidents in AOR
- Keep vigil on the selling/purchasing of wildlife in local markets.

4.1.1 Wood Cutting

The importance of plants to humans and just about all other life on Earth is staggering. Life as we know it would not be possible without plants. They are the main source of food for all animals, they are source of oxygen, medicine, fuel, furniture etc for humans but the current percentage of plants on earth is decreasing due to deforestation and illegal wood cutting.

Fire wood consumption at Bari Imam Shrine in past decade were used wood of Margallah Hills National Park, causes immense loss of tree cover in Nurpur range of national park. One IWMB staff appointed only for vigilance on Degh house. In the result of that the wood consumption from MHNP controlled and now they used fuel wood purchased from timber wood store. The given below list of wood cutting cases have been reported carrying young trees and branches from the park, which create severe loss on young trees and also habitat of wildlife.

Sr#	**Detail of Culprits**	**Number**
01.	Head Loads	43
02.	Motorcycle Wood load	16
03.	Corolla Car (Fuel Wood)	09
04.	Suzuki Pickups loaded with fuel wood	07
05.	Camel loaded with fuel wood	03
06.	Suzuki Bolan loaded with fuel wood	04

Note: The woodcutting culprits was apprehended by IWMB team and handed over to MCI Forest officer for fine. *During the year 2018-2019 total fine on wood cutting by IWMB is RS. 64,460/=*.

4.1.2 Vegetation Management (Removal of Invasive Plant Species)

For conservation of natural habitat and preservation of national park it is of ultimate importance to remove alien invasive species and replace them with indigenous plants of MHNP. The IWMB protection team was involved in the removal of Lantana along the trail numbers 3, 5 and 6 one by one. Lantana species have been removed from the National Park and replaced by local plants like, pine, wild pomegranate and Kachnar etc.

Similarly to raise awareness on the importance of indigenous trees for local ecosystems and to offer support to Government of Pakistan's vision of "Clean and Green Pakistan Programme" Islamabad Wildlife Management Board with the collaboration of University students and Khushaali Micro Finance Bank has undertaken a project of "Plantation of indigenous trees and removal of invasive alien species from the Margalla Hills National Park".

Under this project 3 hactare area of the plant removed from Alien Invasive Species mostly *Lanatana camara* leading to promotion of growth of local indigenous trees of MHNP and increased awareness amongst citizens and others stakeholders with regard to the presence and impacts of *Lantana camara* in Islamabad has been achieved. Parthenium has also been removed from Trail 5 campsite.

IWMB will develop a plan of action for the removal of these species from the Margalla Hills National Park.

4.1.3 Sitting Areas/Camp Site

Due to large numbers of visitors on Trail 5, the trail gets full very often and people start lighting cooking fires and do barbeque in the prohibited areas. To avoid this situation the new children campsite has been constructed on trail 5. Lantana in the area has been thoroughly removed however some paper mulberry trees are still present. A sit out has been constructed as a sample in the new camp site.

4.1.4 Restoration and supervision of trail.

To improve the conditions of the park and trails and to provide better facilities to the visitors of national park. IWMB is engaged in the restoration and maintenance of trail at Shakarparian. Stone pitching of Trail-5 for the convenience of visitors of the national park.

4.1.5 Plastic free park:

A ban on bottled water in 23 national parks prevented up to 2m plastic bottles from being used and discarded every year. That is equivalent to up to 326 barrels of oil worth of emissions, 419 cubic yards of landfill space and 111,743lb of plastic, according to a study. Keeping this in mind the IWMB aims to make the MHNP plastic free, so any plastic or dispose able bottles or food stuff entry in the park is prohibited.

Protection staff control the plastic pollution in the Park, in 2018-2019 Margallah Hills National Park declare as plastic free park.

4.1.6 Fire Management:

The fire season starts every year from April to August in Margalla Hills National Park. The fires in the Margalla can erupt due to several reasons such as rising temperatures, burning of garbage or dried leaves or even due to the discarding of burnt cigarettes in the forest area.

MOU has been signed between IWMB and MCI at the office of Federal Ombudsman in which detailed strategies and policies were identified to manage the forest fires in MHNP. MCI is

responsible for the fire management in Margalla Hills National park for the year 2019 as they have budget and staff allocated for this function.

An operational plan has been shared with MCI according to that upon receiving a request from MCI for assistance in firefighting in Margalla Hills National Park. A team of 10 IWMB field staff will be "on call" for assistance and coordination in the event of outbreak of fire in MHNP.

One (1) supervisor and one (1) driver along with one (1) vehicle will be available for transportation of men and material to any fire affected area.

Forty one (41) member patrolling team is continuing intervene patrolling on Damn-e-koh/Pir Sohawa road and will forward first-hand information in case of any break out of fire to MCI control room.

4.1.7 Illegal trade of Wildlife in Islamabad capital territory (ICT)

One of the major threats that the park is facing is illegal trade of the wildlife some examples of illegal wildlife trade in the park are well known, for example pangolin which is one of the most illegally traded mammal on the planet and leopards which are illegally traded for their skins and bones. However, countless other species are similarly overexploited, from marine turtles to timber trees.

Stamping out wildlife crime is a priority for IWMB because it's the largest direct threat to the future of many of the world's most threatened species. It is second only to habitat destruction in overall threats against species survival.

In the year 2018- 2019 following wild animals confiscated and released in natural habitat and in wildlife sanctuary;

Sr#	Name of Species	Scientific Name	Number	IUCN Status
01.	Black Bear	*Ursus thibetanus*	03	Vulnerable
02.	Leopard Cat	*Prionailurus bengalensis*	01	Least Concern
03.	Rhesus Monkey	*Macaca mulatta*	02	Least Concern
04.	Indian Pangolin	*Manis crassicaudata*	01	Endangered
05.	Rose Ringed Parakeet	*Psittacula krameri*	67	Least Concern

06.	Alexandrine Parakeets	*Psittacula eupatria*	03	Near Threatened
07.	Grey Partridge	*Francolinus pondicerianus*	09	Least Concern
08.	Black Partridge	*Francolinus francolinus*	06	Least Concern
09.	Chukar	*Alectoris chukar*	17	Least Concern
10.	Spotted Munia	*Lonchura punctulata*	265	Least Concern
11.	House Sparrow	*Passer domesticus*	300	Least Concern
12.	Common Quail	*Coturnix coturnix*	08	Least Concern
13.	Baya Weaver	*Ploceus philippinus*	157	Least Concern
14.	Bank Myna	*Acridotheres ginginianus*	125	Least Concern
15.	Common Myna	*Acridotheres tristis*	76	Least Concern
16.	Common Starling	*Sturnus vulgaris*	48	Least Concern
17.	Rock Pigeon	*Columba livia*	16	Least Concern
18.	Indian Rock Python	*Python molurus*	01	Near Threatened
19.	Indian Black Pond Turtle	*Geoclemys hamiltonii*	01	Endangered
20.	Brown Roofed Turtle	*Pangshura smithii*	12	Near Threatened
21.	Indian Roofed Turtle	*Pangshura tecta*	13	Least Concern
22.	Indian Flap Shell Turtle	*Lissemys punctata*	11	Least Concern
23.	Indian Spiny Tailed Lizard	*Saara hardwickii*	08	Least Concern
Total			**1150**	




4.1.8 Encroachments

The foot print of the unregulated settlements located within the MHNP has continued to increase, and proportional to the increase in population of these settlements the footprint has also multiplied since the establishment of Islamabad as a capital territory. The government institutions located adjacent to the park have also formally and informally encroached into the park and the land this occupied by them is not accessible to the general public for recreational or educational purposes. Again, given the resources at its disposal the CDA has not been able to effectively control or manage these encroachments.

Margallah Hills highlights the green character and enhance the green cover of the area due to which Margallah Hills have been declared National Park Area, where all kinds of construction and commercial activities should not be allowed.

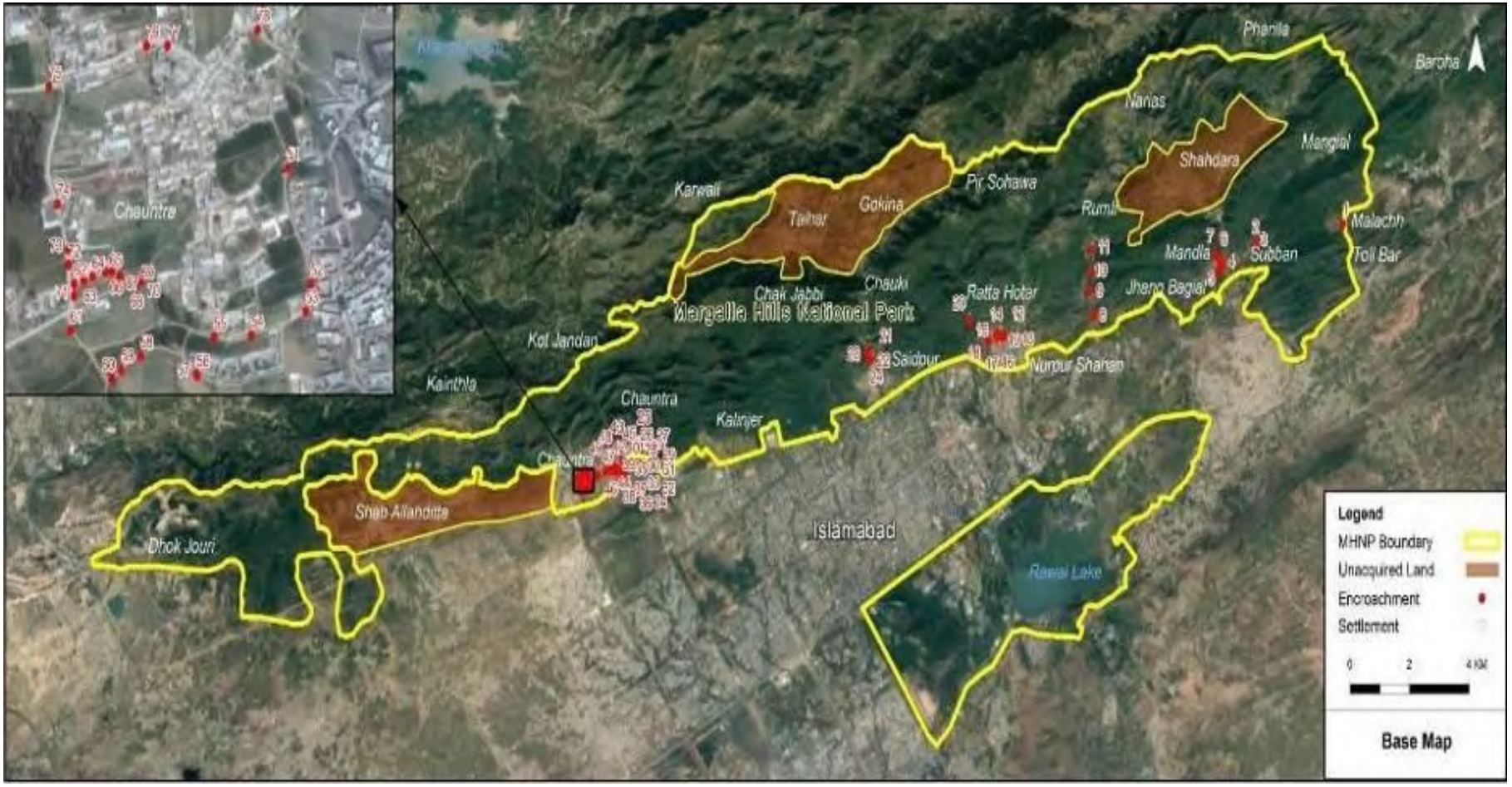
As per IWMB's working method, the Islamabad Wildlife Management Board informs the CDA enforcement Directorate through Chairman CDA office on any encroachments IWMB staff identifies in the MHNP. These encroachments in MHNP are violation of the section 12.4 (iv)

of the Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance, 1979 and Chapter III, Section 3 (b, d & e) of Islamabad Capital Territory Zoning Regulations- 1992 and it is the responsibility of the CDA Enforcement Directorate to remove the encroachments.

The encroachment of 3 houses and their livestock in the Park at Jabbi, have been successfully removed. Fresh encroachments in Saidpur, Nurpur and Ratta Hotar area have been identified and the report has been submitted to Chairman CDA, Federal Ombudsman and Enforcement Directorate-CDA for further action.

This act by criminal elements if permitted to continue threatens the very existence of the Margalla Hills National Park where all and sundry would be encourage to grab valuable state land.Chairman IWMB is in direct contact with Pak-Environment Protection Agency on the matter of construction of a cricket stadium in the area falling under the Margalla Hills National Park and quarrying in its proximity from where approximately 77000 cubic meters of earth has been removed from Shakarparian at the same time when I-8 interchange was constructed but despite of all the letters no action has been taken by Pak-EPA yet.

Fresh Encroachments in Nurpur



4.1.9 Protection of Biodiversity at Rawal Lake

Illegal unreported and unregulated fishing was taking place that influence a negative and harmful impact on the overall ecological environment of Rawal Lake.

According to information provided by locals and observations made several types of fishing gears, e.g. cast nets, small mesh size nets, gillnets are employed for fishing in the Rawal Lake. Gill nets and cast nets, especially those with small mesh size, tend to be nonselective in their catch. Thus, large quantity of fish, Smaller than the legal-size limit, are captured and killed as by-catch by these practices. In some areas, explosives are used to kill fish in the corners of Lake, a practice that not only kills the target fish but also damages and destroys the entire ecosystem in the area. It was also informed that using electric currents to stun and capture fish is a non-selective fishing practice that kills a large number of fish at one time.

Most of the hunting and fishing is carried out by the help of local (commercial and leisure) boat owners. While different people also provide the boats on rental basis. Therefore, a multipurpose strategy was required to eliminate hunting and fishing activities in the area as well as observing and monitoring other human activities in the lake area. In order to minimize the hunting issue IWMB has developed a strategy of joint patrolling in the morning and evening when usually hunting takes place.

The Islamabad Wildlife management Board which oversees the lake, had prohibited all forms of fishing, with strict control over the last few months.

4.1.10 Joint Patrolling with Navy for Park Protection:

Collaboration has been developed between the Islamabad Wildlife Management Board and Pakistan Navy for better protection and conservation of the Margalla Hills National Park. Arson in Margalla Hills needs to be managed and controlled to avoid such incidences in future, for this IWMB has planned a regular joint patrolling of IWMB and PN staff. The drone technology has been used to monitor entry points of the park from the north side (Village Talhar, Gokina) South (Faisal Mosque and Trail 4). Issue of Community Liaison are being managed by IWMB and Pakistan Navy has been kept informed.

4.1.11 Installation of new boards for visitor's information

Most of the visitors are unaware of the value, flora and fauna of Margalla Hills National Park. As part of the efforts for promoting awareness among visitors of the park, IWMB in in process to install the new sign boards containing dos and donts of the park, parking signs, anti litirng signs, raod signs, basic information regarding plants, birds, mammals, reptiles and invasive species in the MHNP.

4.1.12 Inauguration of Ridge trail

Chairman Islamabad Wildlife Management Board, KP Tourism Secretary and Mayor Islamabad inaugurated the longest Margalla Ridge Trail on November 3, 2018.

Margallah Ridge Trail is the longest single trans-provisional trail in the country starting from Shah Allah Ditta area of Islamabad to Summa area of KP. The total length of the track is 44 kilometers. Trail had several exit points at different locations. The largest part of the trail, around 30-35 kilometers, fall in the limits of KP.

4.1.13 Margalla Eco-Marathon

On 9th September 2018, the race titled “Mini Margalla Eco Marathon” started at 7am in which more than 255 citizens (226male and 29 female) participated. There were 11 foreigners who actively participated. The participants were divided into three categories: participants above 60, participants between the ages of 40 and 60 and participants below the age of 40. The route of this mini marathon was from Muraghzar Zoo to Daman-e-Koh and back to Muraghzar Zoo (on the road to Pir sohawa). A Prize distribution event was held at the end of the race. At the end of the race cash prizes of Rs.10,000/- Rs.6,000/- Rs.3,000/- were awarded respectively to

1st, 2nd and 3rd position holders in male and female categories and they were also presented winner trophies.

Similarly On December 2nd, 2018, the race titled Serena Hotels Margalla Mountain Half Marathon and 5.5k speed run started at 7:50 a.m. Approximately 150 runners participated in half marathon and more than 150 runners in the 5.5 K run. Participants were between the ages of 40 and 60 and below the age of 40.

The Margalla Mountain Half Marathon was 21.5 km race that started from parking lot of trail 5 at 07:50hours and proceeded on Margalla road to trail 4 and then persisted on to trail 6 and then the athletes climbed 600 meters to the ridge, then they ran along the ridge passing the Monal and La Montana restaurants and descended down trail 3, crossed over trail 5 and culminated at the Visitor Information Center of trail 5,".

A Prize distribution event was held at the end of the race. Cash prizes of 40,000, 20,000 and 10,000 were awarded to the 1st, 2nd and 3rd position holders of half marathon, similarly cash prizes of 10,000, 6000, and 3000 were given to the winners of 5.5k speed run. Medals and certificates were also awarded to the first 20 finishers of the half marathon.

5. Protection of Margallah Hills National Park through involvement of local Communities:

The main aim of the community relations program is to establish and maintain an understanding with Margallah Hills National Park's local communities (32 villages) to conserve and manage Park's natural resources and raising their living conditions. From July 2018 to June 2019, under the community relations program, area identification, community resource person selection, village committee formation, community awareness sessions and encroachment identification has been carried out.

Social mobilization component is focusing on educating local communities and in the 32 villages in the whole park.

Detail of IWMB's Community Relations Activities

Sr. No	Activities	Progress
1.	Area Identification	03 Villages
2.	Community Resource Person Identification	03 persons
3.	Community Resource Person Selection	22 persons

4.	Focal Group Discussion Meetings	04 meetings
5.	Village Profile/Assessment	03 Villages
6.	Village Committee (VC) Formation	20 Villages
7.	Village Committee Meetings	08 meetings
8.	Community Resource Person Meetings	24 meetings
9.	Community Awareness Session regarding (Wood cutting, hunting/poaching, encroachment, forest fire etc.	39 Sessions
10.	Kachnar permit distribution for vulnerable people	171 permits

5.1 Agenda of the Community Meetings and Sessions

The purpose of the above mentioned awareness session, community meeting, focus group discussion and follow up visit is as under

- To highlighting the importance of the National Park
- To increase the public awareness regarding the issues of MNHP.
- To enhance Public contact
- To encourage and support the local people to increase contact with working governments and private organizations in their respective areas.
- To highlight the risks and threats faced by the Wildlife and Forest and to get local people's cooperation to resolve it.
- To resolve issues with consensus, promote organization formation.

5.2 Output of Community Relations

- Community have supported and participated in activities like meetings, sessions etc.
- Many times community have informed about illegal hunting, wood cutting and encroachment.

5.3 Wildlife Conservation through Social Mobilization

- Draft social mobilization strategy for community relations
- The strategy of social mobilization will support in organizing communities, sensitization and it will be road map for IWMB and betterment of communications between communities and IWMB.
- It will change the image of IWMB through participatory approach.

6. Protection through Awareness and Education:

Environmental Education (EE) refers to organized efforts to teach how natural environments function, and particularly, how human beings can manage behavior and ecosystems to live sustainably.

6.1 Objectives of Education Program MHNP

The objectives are clear and bold,

1. To educate the teachers and students of institution around the Marghalla Hills National Park
2. To educate the public in respect to the nature and quality of the Marghalla Hills National Park
3. To use existing promotional and educational systems so as to produce a wide result.

4. To association in one attention the sympathy and activity of schools, colleges and citizen organizations in Marghalla Hills National Park
5. To study the background literature and science of Marghalla Hills National Park and collect data for future use.

6.2 Concept Map of Environmental Education Awareness Program of Islamabad Wildlife Management Board (IWMB)

Sr#	Activity		Time for Activity	Area
1.	Introduction of Marghalla Hills National Park (MHNP)		10 minutes	Outdoor Education Center
2.	Field Based Activities		120 Minutes	Field area of MHNP
	2.1	Birds Watching Activity		
	2.2	Pug Mark Survey		
	2.3	Foot Print Casting		
	2.4	Pond Dipping		
	2.5	Soil Making Activity		
	2.6	Seed Ball Making Activity		
3.	Carcass Investigations		30 Minutes	MHNP
4.	Tree Identification		15 Minutes	MHNP
5.	Find Direction without Compass		10 Minutes	MHNP
6.	Food Web Activity		20 Minutes	MHNP
7.	Tent Pitching		30 Minutes	Camping Site of MHNP
8.	Guided Trek		50 Minutes	Trails of MHNP
9.	Concluding Remarks/Answers & Questions		15 Minutes	Outdoor Education Center

6.3 Awareness sessions during the year:

The total awareness sessions during July-2018 to June-2019 are 62 with 1943 participants. In these sessions mainly participate following institutions;

1. Local Schools Located in MHNP

2. Universities
3. Departments; NGOs
4. General Public/ Visitors of MHNP.

The above mentioned hands on activities done at outdoor education center at trail-5 which includes; introduction of MHNP, their Biodiversity, Importance, and field based activities (Birds watching, pond dipping, Pug mark survey, foot print casting, Scavenger hunt, tree identification, tent pitching and guided trek. During the activities the importance of nature discuss and how to protect the natural resources from exploitation. Basically main aim to aware the public to conserve the native flora & fauna of Margallah Hills National Park,

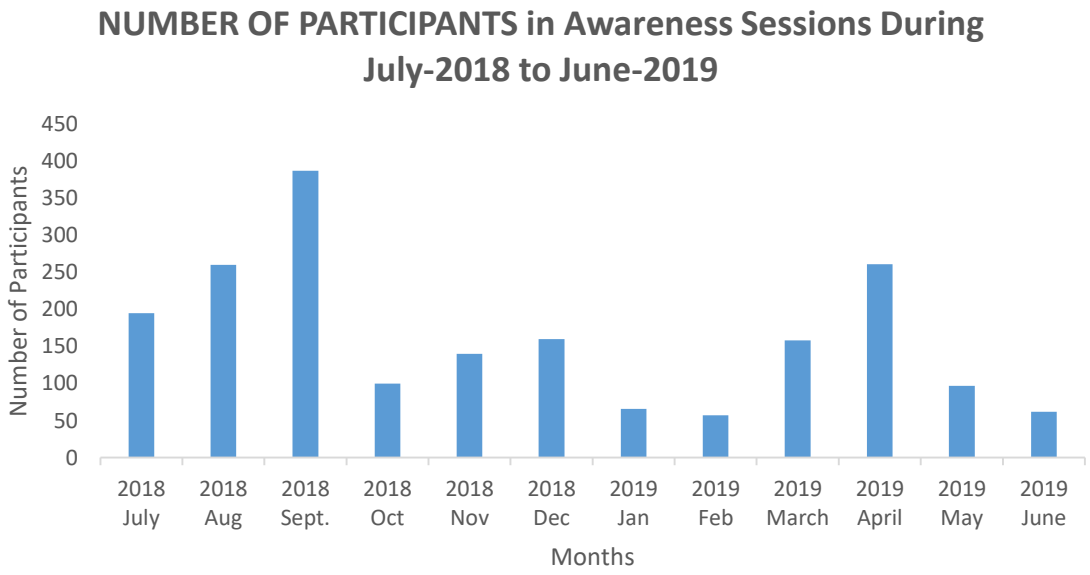


Figure: Number of Participants in awareness sessions at outdoor Education center at VIC Trail -5.

The details of Sessions during the July-2018 to June-2019 is given below table which include the name of institute, Department, Number of Participants and detail of activities performed at Visitor Information Center Trail-5.

Month	Sr#	Institute/Department Name	No. of Participants	Details
July-2018	01	SMEC Oil & Gas with Baharia University Students	40	Seed Ball making
	02	Learn A Licious Summer School, Islamabad.	45	Awareness, seed ball making and Guided trek
	03	University of Arid Agriculture, Rawalpindi	35	Awareness Session
	04	Comsats University Islamabad	75	Clean up Drive
Aug-2018	05	Baharia University	95	Awareness & Education, seeds ball and tent pitching.
	06	F. G. Primary School Rumli	60	Awareness Lecture in the School
	07	WWF-Pakistan	35	Plantation
	08	SMEC Oil and Gas and University students	30	Seed Ball making
	09	Behbud Primary English Medium School	40	Awareness Lecture in the School
Sept 2018	10	STFP, WWF, HWF	50	Plantation Drive
	11	F. G. Model School F-8/2 Islamabad.	180	Awareness Lecture in the School
	12	IMSG Noor Pur Shahan Bari Imam	10	Painting Competition & Awareness Activities
	13	Mashal Model School	12	
	14	Usmania Technical School	08	
	15	Roshni Maktab School	12	
	16	The EFA School System	07	
	17	IMS F-6/3 Islamabad.	05	
	18	Asif Public Model School	08	
	19	Sultan Model School	12	
	20	IMSG Saidpur	10	
	21	IMSB Saidpur	05	
	22	IMS F-6/4 Islamabad.	05	
	23	IMS F-8/2 Islamabad.	05	
	24	IMS E-7/4 Islamabad.	10	
	25	IMSG Shah Allah Ditta	12	
	26	IMSG Talhar	10	
	27	IMCG QAU Colony	05	
	28	IMSB Shahdra	08	
	29	IMSG Shahdra	08	
Oct-2018	30	Beacon House Abbottabad	50	Awareness Activities & Seeds ball making
	31	Frobel's School	35	
	32	Visit of Koraen	15	
Jan-2019	41	QAU, Islamabad.	28	

	42	Dett. Of Env. Sciences FJWU	38	Seeds Balls and introduction of MHNP
Feb-2019	43	INAM, Islamabad	22	Seeds Balls and introduction of MHNP
	44	Liberal Arts F-7	35	
March-2019	45	Group of Foreigners with Momi Saleem	30	Introduction and Guided trek
	46	Khushali Bank	40	Seeds Balls and introduction of MHNP
	47	PMAS-Arid Agriculture University, Rawalpindi.	25	Seminar on World Wildlife Day 2019
	48	University of Haripur.	12	
	49	QAU, Islamabad	22	
	50	Ecosystem Conservancy	10	
Apil-2019	51	Pakistan Forest Institute, Peshwar.	85	Introduction and Guided trek
	52	Beacon House H-8 Campus	65	Introduction and Guided trek
	53	Wildlife Traders Workshop	15	Introduction and Guided trek
	54	Training for communities to Seeds balls making process	16	Training of seeds balls making.
	55	Deptt. Of Behavioral Sciences, FJWU.	25	Seeds Balls and introduction of MHNP
	56	Deptt. Of Zoology UCP.	55	
May-2019	57.	Iqra University	35	Seeds Balls and introduction of MHNP
	58.	Baharia University	40	
	59.	Saint Francis School, Rwp	22	
June-2019	60	NUST, Islamabad.	12	Radio Telemetry, Introduction of MHNP
	61	Air university & SMEC Oil & Gas	45	Seeds Balls and introduction of MHNP
	62	Session with research students	05	Research Group

6.4 On-going Programs:

- Junior Ranger Program (School Students)
- Young Scientist Program (University Students)
- Teacher Training Program (Biodiversity Ambassador)
- Awareness Programs for Wildlife Traders/Woodcutters
- Out of the Classroom and into the Margallah Hills National Park

6.5 Clean-up activities:

With clean up drives at different Trails of the Margalla Hills National Park many tons of garbage and litter has been removed with the help of university and school students along with IWMB team.


7. RESEARCH & PLANNING:

Three universities were considered for carrying out ecological researches in the Margalla Hills National Park. The universities were Quaid-e-Azam University Islamabad, PMAS Arid Agriculture University Rawalpindi and International Islamic university Islamabad based on the strength of the relevant department of the university and the faculty. These universities entered into an agreement with the prior approval of scientific committee of the IWMB and signed the memorandum of understanding. The students of these universities are conducting different ecological studies. They are being supervised by their own faculty and are facilitated by the project.

7.1 Camera trap study

The camera trapping study started on year 2018. The study was carried out by establishing three basecamps at three different potential sites in the national park. A total of 30 cameras were installed, each for 14 days and were monitored on daily basis from the basecamps. Screening of the photo-capture confirms presence of 18 mammalian species in the park;

1. Common Leopard (*Panthera pardus*)
2. Leopard Cat (*Prionailurus bengalensis*)
3. Jungle Cat (*Felis chaus*)
4. Barking deer (*Muntiacus muntjak*)

5. Rhesus Macaque (*Macaca mulatta*)
6. Wild boar (*Sus scrofa*)
7. Red Fox (*Vulpes vulpes*)
8. Golden Jackal (*Canis aureus*)
9. Indian Civet (*Viverricula indica*)
10. Masked Civet (*Paguma larvata*)
11. Common grey mongoose (*Herpestes edwardsi*)
12. Indian Crested Porcupine (*Hystrix indica*)
13. Indian Pangolin (*Manis crassicaudata*)
14. Cape Hare (*Lepus capensis*)
15. Hedgehog (*Paraechinus micropus*)
16. Yellow throated marten (*Martes flavigula*)
17. Turkestan Rat (*Rattus turkestanicus*)

Common Leopard in Margalla Hills National Park (2018-19)

Barking Deer in Margalla Hills National Park

7.2 Flora of Margalla Hills National Park

Floral Study has been initiated in Margalla Hills National Park to know about the vegetation and plant species of the park. The important observations of the report show that a species-specific insect *Zygogorama bichlorata* attacks the invasive species *Parthenium hysterophorous* and retards its growth so in this way the introduction of this insect in Margalla Hills National Park would be a biological control of the invasive alien species

7.3 Grey Goral study

A disturbing truth that seemed to have emerged is that Grey Goral Population might have succumbed to poaching and loss of habitat due to human encroachment and the disturbance due to a large number of domestic animals grazing in the park. However, a thorough survey of the entire park is required to find out the truth about its population.

7.4 Study of water quality and macro invertebrates in the soil and water of MHNP:

Recently a group of Kinnaird College students are engaged in carrying out the study of water quality and macro invertebrates in the soil and water ecosystem of Margalla Hills National Park and genetic and spatiotemporal distribution of avian fauna in MHNP. The presence of pollution sensitive species of macro-invertebrates in the streams that flow through MHNP was indicative of very good water quality. The water quality of Korang Nala after passing through human habitations was very poor and it lacked macro-invertebrate diversity. Only pollution tolerant midges were there. *E. coli* were abundant. The water quality of Korang Stream, however improved in Rawal Lake, as indicated by the presence of pollution sensitive species in the water after the spillway. Even E. coli were not found in this place.

Students are engaged in scientific studies in MHNP

8. STAFF TRAINING:

IWMB staff was provided training on the following:

1. **Ecology and conservation of mammals, birds and reptiles**

   Training was provided to the IWMB staff to know about the biodiversity of Islamabad and its significance. The major fauna and flora of the area were discussed.

2. **Bird and Mammals Identification**

   Field methodologies were discussed by Senior Professor Dr. Z.B Mirza with the IWMB team so that they should know how to identify the important mammals and birds of the Park.

3. **Community Relations**

   Training was provided to the IWMB team so that they can understand in a better way that how this firm should interact with the people constituting the environment it operates in and draws resources from, to foster mutual understanding, trust, and support.

4. **Ecotourism**

The training was all about that how ecotourism is a form of tourism involving visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and often small scale alternative to standard commercial mass tourism. How it is responsible for travelling to natural areas conserving the environment and improving the well-being of the local people. Its purpose was to educate the traveler, to provide funds for ecological conservation, to directly benefit the economic development and political empowerment of local communities, or to foster respect for different cultures and for human rights.

5. **Plants Identification**

A basic training was provided to the IWMB team so that they can be able to differentiate between the different specie of the plant and identify them.

6. **Fish identification, Fish fauna of Rawal Lake**

There are diversified forms of fish in Rawal lake and pond of Margalla Hills so a training was provided to the staff so that they will be able to differentiate between the different forms of fish.

7. **Small Mammals**

There are many important small mammals residing in the park so training was provided to identify them and manage them in a proper way.

8. **Littering Issues**

Litter is any kind of trash thrown in small amounts, especially in places where it doesn't belong. With time, it heaps up. The practice is unlawful because it costs municipalities millions of rupees annually in cleanup costs. It also portrays a bad picture of an area. The most frequent littered stuff include fast food packaging, cigarette butts, used drink bottles, chewing gum wrappers, broken electrical equipment parts, toys, broken glass, food scraps or green wastes. So a training was essential for the IWMB to make policies and draw plans to keep Margalla Hills National park clean.

9. Health Safety and Environment

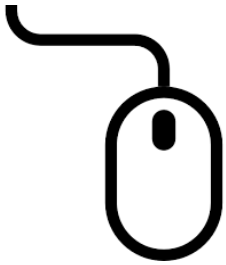
For the IWMB administration staff health and safety of the employees and the visitors of the Park is their main priority, so the Rescue 1122 trainers provided the training to the IWMB team for first aid and fire management etc.

10. Basic First Aid

Many important Standard operating procedures for snake bite and first aid were developed to know how to deal in emergency situations.

11. Spatial Monitoring and Reporting Tool Training:

To improve anti-poaching efforts and overall law enforcement effectiveness in established conservation areas and management zones WWF-Pak provided hands on training to IWMB staff on the application of SMART.



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