

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

Performance Report 2016-17

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

1. Mission Statement

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

2. Main Functions

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

- a. **Research:** the research program is driven by national policy goals, namely protecting people against the impacts of climate change, promoting economic growth and sustainable development in a climate-constrained future, and honoring Pakistan's international commitments. To these ends, research is organized in three groups:
 - ***Climatology and Environment:*** 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 glaciers, aggregate and seasonal flows in the Indus Basin System, and changes in watershed behavior.
 - ***Agriculture, Forestry & Land Use:*** use of crop simulation & water management modeling to predict the impact of projected changes in temperature, precipitation, and water availability on Agriculture, Forestry, Land Use

- b. **Capacity building:** imparting technical and communication skills to GCISC staff as well as students and climate scientists at other national research organizations and universities.
- c. **Dissemination of research findings:** to the scientific community, planners, policy makers, and to the public at large, in order to raise awareness of climate change among policymakers as well as the citizenry.

3. Ongoing Research Activities

I. Climatology & Environment Section

- Assessment of past climate changes in various parts of Pakistan using statistical analysis techniques;
- Projection of future climate changes over Pakistan and its various regions based on:
 - i). analysis of the outputs of a suite of Global Circulation Models (GCMs)
 - ii). dynamical downscaling of the data sets of coarse resolution GCMs using state-of-the-art regional climate models (RCMs)
 - iii). employing statistical downscaling techniques.
- Study the extreme climate and weather events using simulation models and development of indicators and indices for climate extremes over Pakistan. Development of methodological tools for projecting future frequency & intensity patterns of extreme events;
- Development of seasonal, inter-annual and decadal climate predictability systems; Predictability of Asian Summer Monsoon System;
- Updating of GHG Inventory of Pakistan for Energy & Industry Sectors;
- Analysis of alternative Energy Sector Strategies for Pakistan in relation to GHG and other pollutant emissions.

II. Water Resources & Glaciology Section

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

III. Agriculture, Forestry and Land Use Section

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

4. Achievements and Progress of GCISC:

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

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

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

- i. **Aftab. A, M Ijaz**, J. Muhammad, **M.A. Goheer**, G. Akbar and **M. Adnan** (2017). Climate Change Implications for Wheat Crop in Dera Ismail Khan District of Khyber Pakhtunkhwa Pakistan Journal of Meteorology Vol.13, Issue 25, page 17-27, ISSN 1810-3979.
- ii. Almazroui, Mansour, Nazrul Islam, M., Balkhair, Khaled S., Sen, Zekai, **Masood, Amjad**, (2017) Rainwater harvesting possibility under climate change: A basin-scale case study over western province of Saudi Arabia, **Atmospheric Research**,189(2019), 11-23 doi:10.1016/j.atmosres.
- iii. Khalil Ur Rahman, Khaled S. Balkhair, Mansour Almazroui, **Amjad Masood**, (2017) Sub-catchments flow losses computation using Muskingum-Cunge routing method and HEC-HMS GIS based techniques, case study of Wadi Al-Lith, Saudi Arabia, Modeling Earth Systems and Environment Journal 3:4, DOI 10.1007/s40808-017-0268-1.
- iv. Bushra Khalid, Cholaw Bueh, Shumaila Javeed, **Shaukat Ali**, Qaiser Sultana and Ayesha Khalid, (2016): An Application of Single Model Ensemble System for Seasonal Prediction of Winter Temperature for Islamabad and Lahore using Coupled General Circulation Models. Journal of Weather. Vol. 99, No. 99, DOI: 10.1002/wea.2832.
- v. Gul, C., Kang, S. C., Ghauri, B., Haq, M., Muhammad, S., & **Shaukat Ali**. (2017). Using Landsat images to monitor changes in the snow-covered area

of selected glaciers in northern Pakistan. *Journal of Mountain Science*, 14(10), 2013-2027.

- vi. **Muhammad Adnan, Nadia Rehman, Muhammad Munir Sheikh, Aftab Ahmad Khan, Kaleem Anwar Mir** and Muhammad Ahson Khan. (2016). "Influence of Natural Forcing Phenomena on Precipitation of Pakistan", *Pakistan Journal of Meteorology*. Vol. 12, Issue 24: 23-35.
- vii. **Adnan M., Rehman N.**, Shahbir J., "Predicting the Frequency and Intensity of Climate Extremes by Regression Models" *J. Climatol. Weather Forecasting*, 2016, 4(3):185. Doi:10.4172/2332-2594.1000185.
- viii. **Kaleem Anwar Mir**, Pallav Purohit, Gary A. Goldstein, Rajasekhar Balasubramanian (2016) "Analysis of baseline and alternative air quality scenarios for Pakistan: an integrated approach", *Environ Sci Pollut Res*. doi:10.1007/s11356-016-7358-x.
- ix. Azharuddin, S., and **Dogar, M. M.** (2016). Decadal climate variability and predictability. *CURRENT SCIENCE*, 110(8), 1397-1398.
- x. Osipov, S., **Dogar, M.**, and Stenchikov, G. (2016, April). Study of Regional Volcanic Impact on the Middle East and North Africa using high-resolution global and regional models. *Geophysical Research Abstracts*, Vol. 18, EGU2016-8617, 2016.
- xi. Khan, F. - P, Jürgen and **Ali, S.** (2016). Improved Hydrological Projections and Reservoir Management in the Upper Indus Basin under the Changing Climate. *Water and Environment Journal*. DOI: 10.1111/wej.12237. ISSN 1747-6585.
- xii. **Khan, A. A.**, J. Muhammad, G. D. Khan, **M. Ijaz** and **M. Adnan**, (2016). Quantitative Analysis of Watershed Hydrology for Kandar Dam (Kohat) using Remote Sensing and Geographic Information System (GIS) Techniques, *Pakistan Journal of Meteorology*, 12(24):15-22.
- xiii. Kamran, A., **M. A. Goheer**, K. Saifullah and s. Amir (2016) Cooperation of Harnessing Benefits of Transboundary Water in Indus Basin. *Compendium of Research Studies 'Water Cooperation through Leadership and Institutional Development'* compiled by LEAD Pakistan.

6. Technical Research Reports (4):

- i. INDC-MoCC-GoP (2016), Pak-INDC Submitted to UNFCCC, a joint effort of Global Change Impact Studies Centre (GCISC), Ministry of Climate Change and other Government Agencies. <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf>;
- ii. Nuzba Shaheen and Muhammad Arif Goheer (2016) Technical Report of the project on Climate smart agriculture through sustainable water use management: Exploring new approaches and devising

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

- iii. Ali, S., Eum, Hyung-II., (2016): Multi-climate model climatic extremes, hydrological scenarios projections and associated uncertainties over Pakistan;
- iv. Kaleem Anwar Mir and Muhammad Ijaz. (2016). Greenhouse Gas Emission Inventory of Pakistan for the Year 2011-12, GCISC-RR-19, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan.

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

- i. Muhammad Arif Goheer delivered a presentation on 'GHG emissions from Rice Cultivation in Pakistan' in the Rice Working Group during 1st Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 7-9 June 2017, Bilbao, Spain;
- ii. Shaukat Ali delivered a presentation on 'Statistical downscaling using long-term trend preserving bias correction methods (DQM and QDM), for extreme climatic and hydrological events over Pakistan' in The Third workshop on Atmospheric Composition and the Asian Monsoon (ACAM), 5-12 June 2017, China;
- iii. Shaukat Ali (2017) presented on "Quantile delta map for statistical downscaling of climate model data", delivered at Asian Monsoon meeting organized by National Center for Atmospheric Research (NCAR) United State of America and Institute of Atmospheric Physics (IAP) China on 11 June 2017;
- iv. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on 'How the KKH Region be better represented in the IPCC' in the workshop on Understanding Climate Change and Enabling Climate Actions with a Special Focus on Mountain Systems of the Hindu Kush Himalayas, April 2017, Nepal;
- v. Amjad Masood participated in International Seminar on "Managing Indus Basin for Sustainable Development, Food Security and Poverty Alleviation" at CEWRE UET, Lahore-13 Apr 2017;
- vi. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on 'Future Runoff Scenarios using Statistically Downscaled RCM data in Hydrological Modelling' in APN Project 'Runoff Scenario and Water Based Adaptation Strategies in South Asia (ARCP2012-SP29-Shrestha)' related activity, March 2017, Nepal;
- vii. Nuzba Shaheen delivered a presentation on Climate Smart Agriculture: Using Best Practices for adaptation and Mitigation in Asia in Capacity Building Workshop and Science-Policy Dialogue on Climate Change: Low

Carbon and Adaptation Initiatives in Asia 06-08 February 2017, February 2017, Thailand;

- viii. Shahbaz Mehmood contributed in Regional Level Sharing Workshop for the Project Runoff Scenario and Water Based Adaptation Strategies in South Asia (ARCP2012-SP29-Shrestha), February 2017, Bangladesh;
- ix. Muhammad Arif Goheer contributed to the negotiations on Agriculture, Forestry & Land Use and Adaptation streams in the 22nd Session of Conference of Parties (COP-22) as a Government delegate from 7-19 November 2016, Marrakesh, Morocco;
- x. Muhammad Arif Goheer contributed to the negotiations with Coalition for Rainforest Nations (CfRN) during COP-22 which led to the acquisition of country membership in coalition and engagement of Pakistan in Reporting for Results Based REDD+ activities under CfRN;
- xi. Kaleem Anwar Mir, Participated as energy sector review expert in the "In-country review of Malta's 2016 GHG submission", October 2016, Malta;
- xii. Muhammad Amjad, (2016) "Generation of Regional Climate Data and Research in Pakistan" presented at APCC Training Program 2016 on Generation of Regional Climate Data derived from Statistical Downscaling Techniques during 22 – 27 August 2016 at APCC, Busan, Republic of Korea;
- xiii. Arif Goheer delivered a presentation on 'Preparation of Pakistan's INDC' in Workshop on 'Unpacking (I)NDCs- identifying, prioritizing, planning and implementing mitigation and adaptation measures' organized by International Partnership on Mitigation and MRV in association with Department of Meteorology, Hydrology and Climate Change (DMHCC), 26-27 July 2016 in Ha Noi, Vietnam;
- xiv. Arif Goheer moderated a session on 'Developing an Action Plan for a Cross-Cutting Sector with Data Limitations' in the Workshop on 'Unpacking (I)NDCs- identifying, prioritizing, planning and implementing mitigation and adaptation measures' organized by International Partnership on Mitigation and MRV in association with Department of Meteorology, Hydrology and Climate Change (DMHCC), 26-27 July 2016 in Ha Noi, Vietnam;
- xv. Shaukat Ali (2016) delivered a presentation at International Conference on Challenges in Water Security to meet the growing Food requirement organized by AASSA (Association of Academies and Societies of Sciences in Asia and PAS (Pakistan Academy of Sciences), 19-21 July 2016;
- xvi. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on "GLOF-the main drives and how to respond' in Regional Conference on Risks and Solutions: Adaptation Frameworks for Water Resources Planning, Development and Management in South Asia, July 2016, Sri Lanka.

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

- i. Aftab Ahmad Khan, Tahir Burhan and Muhammad Arif Goheer delivered a presentation on Assessment of Spatial and Temporal Variations of Soil Salinity Using Combination of Remote Sensing/GIS and Field Methods in Lakki Marwat on 26 May 2017, Islamabad;
- ii. Aftab Ahmad Khan participated in Training Workshop on Spring-shed Management in HKH Region at NARC/ PARC Islamabad from 17-19 May 2017;
- iii. Muhammad Ijaz delivered a seminar on Estimating Pakistan's GHGs emissions with particular focus on Agriculture sector, at GCISC- 12 May 2017, Islamabad;
- iv. Muhammad Zia-ur-Rahman Hashmi participated in 2-day workshop on, 'Climate Vulnerability Assessment and Adaptation of Water Systems' held from May 11-12, 2017 at USPCASW, MUET, Jamshoro;
- v. Muhammad Arif Goheer delivered a talk on Climate Change and its Implications for Pakistan Agriculture to FAO Mission to Pakistan for the Formulation of Climate Smart Agriculture Project under Green Climate Fund-4 May 2017;
- vi. Syed Mehmood Nasir-First International Conference on Climate Change & Biodiversity by The Islamia University of Bahawalpur-2-4 May 2017;
- vii. Muhammad Arif Goheer-Launching Ceremony of Civil Society Coalition for Climate Change (CSCCC) at Serena-3 May 2017.
- viii. Muhammad Zia-ur-Rahman Hashmi delivered a presentation on Responding to Climate Change in the HKH: Experiences from the recent IPCC Outreach Event in Kathmandu, Nepal, in GCISC Friday Seminar on 28 April 2017, Islamabad;
- ix. Muhammad Amjad delivered a presentation on Climate Change, Sustainable Development Goals and Cities, on 14 Apr 2017, Islamabad;
- x. Nadia Rehman delivered a seminar on Our Planet: Addressing Regional Effects of Extreme Weather Events at GCISC, Islamabad on 7 Apr 2017;
- xi. Arif Goheer delivered a presentation on 'Climate Change Challenges to Food Security in Pakistan: Prospects of Sustainability in Production and Consumption' in the Conference on Contemporary issues in Biosciences organized by University of Wah on 29 March 2017;
- xii. Muhammad Zia-ur-Rahman Hashmi contributed in National workshop on Pakistan's Achievement of Water Related SDGs was held at the Pakistan Council of Research in Water Resources (PCRWR) from 14-15 March 2017;
- xiii. Muhammad Adnan and Nadia Rehman (2017), "Climate Extremes and Desertification Trends over Pakistan in Context of Climate Change", in First International Conference on Emerging Trends in Earth and Environmental Sciences (ETEES), 09-10 March, 2017, College of Earth and Environmental Sciences, University of Punjab, Lahore, Pakistan;

- xiv. Shaukat Ali, M. Adnan, Nadia Rehman, et al (2017), "Future Changes in Drought Characteristics over Pakistan Using Standardized Precipitation Index (SPI): 1970-2099". in First International Conference on Emerging Trends in Earth and Environmental Sciences (ETEES), 09-10 March, 2017, College of Earth and Environmental Sciences, University of Punjab, Lahore, Pakistan;
- xv. Syed Mehmood Nasir participated in two day's workshop on Transboundary Water Governance "Raising awareness and capacity of civil society on transboundary water governance in India and Pakistan" by WWF-Lahore-7-8 Feb 2017;
- xvi. Shahbaz Mehmood (2017), delivered a presentation as Keynote Speaker titled "Climate Change: Past Trends and Development of Future Projections using Climate Models for Impact Assessment Studies", at 1st International PAEC-CIRP Joint Seminar on "Atmospheric Dispersion of Effluents and Radiological Consequences Assessment for Single & Multiple Units NPPs" being held at PNRA Islamabad, January 03 – 05, 2017;
- xvii. Shahbaz Mehmood (2017), delivered a talk as Resource Person on Climate Change Scenarios; Challenges & Opportunities, one-day workshop on "Climate Change Scenario in Pakistan, Issues and Solutions organized by Welfare Council-Islamabad;
- xviii. Arif Goheer delivered a talk on 'Pakistan's Intended Nationally Determined Contributions (INDCs)', in GCISC In-house Seminar on 30 December 2016;
- xix. Amjad Masood delivered a presentation on Climate Change Impacts on Water Resources of Saudi Arabia (Case Study of Wadi Al Lith), at GCISC, Islamabad on 23 December 2016;
- xx. Arif Goheer contributed as resource person for the Training Course on Climate Change Implications and Adaptation for Rural Areas organized by Akhtar Hameed Khan National Centre for Rural Development (AHK NCRD), from 19-23 December 2016 in Islamabad and delivered presentation on 'Impacts of Climate Change on Agriculture and Adaptation Prospects';
- xxi. Aftab Ahmad Khan and Nuzba Shaheen contributed in Mid Term Workshop AgMIP, TOA-MD, R-Script and SPSS Training at University of Agriculture Faisalabad-20-22 Dec 2016;
- xxii. Muhammad Arif Goheer delivered a talk on Negotiating Climate Change: COP-22, From Agreement to Implementation in Friday Seminar at GCISC, Islamabad on 16 December 2016;
- xxiii. Nuzba Shaheen presented on Use of open access climate change scenario data sets by impact modelers: Issues and concerns at GCISC, Islamabad on 9 December 2016;
- xxiv. Syed Mehmood Nasir and Muhammad Arif Goheer delivered a Seminar by on "Recent developments in UNFCCC COP22" at PIDE Islamabad on 07 December 2016;

- xxv. Aftab Ahmad Khan-Participation in "National Conference on Thinking Climate Change Adaptation in Water and Farming THINK-ADAPT" by Climate Change Centre Agriculture University Peshawar-28-30 Nov 2016;
- xxvi. Muhammad Adnan delivered a presentation on Monsoon Variability and Predictability in Pakistan in the context of Climate Change at GCISC, Islamabad on 18 Nov 2016;
- xxvii. Muhammad Zia-ur-Rahman Hashmi participated in Technical dialogue in Fall School on Water Science, governance and policy LUMS Lahore 7-9 November 2016;
- xxviii. Aftab Ahmad Khan delivered a presentation on Potential Rain Water Harvesting Solutions in Thar Desert Areas of Pakistan Using Geo-Spatial techniques in Friday Seminar at GCISC on 04 Nov 2016;
- xxix. Muhammad Zia-ur-Rahman Hashmi contribute to WEF National Conference Islamabad on Water & Environment: Sustainable Development in Changing Climate by MoCC, World Bank, ICIMOD & Water Environment Forum-17-19 Oct 2016;
- xxx. Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood-Meeting on Concerning USAID/USACE Climate Change Training with US Embassy Officials at MoCC-14 Oct 2016;
- xxxi. Arif Goheer delivered a talk on 'Climate Change and its Implications for Food and Water Security in Pakistan' in Training Course on Natural Resource Management organized by Akhtar Hameed Khan National Centre for Rural Development (AKH-NCRD), Islamabad from 03-05 October 2016;
- xxxii. Arif Goheer delivered a presentation on 'Pakistan's Greenhouse Gas Emission Inventory 2015- Key Highlights' in Stakeholders' Consultation workshop on Pakistan INDC Study organized by GCISC and Ministry of Climate Change on August 29, 2016, Islamabad;
- xxxiii. Aftab Ahmed Khan contributed to the Training Workshop on Carbon Sequestration, 1-3 June, 2016, WWF, Islamabad;
- xxxiv. Shaukat Ali (2016), delivered a seminar at COMSATS Islamabad on April 12, 2016 titled "Future Earth and CORDEX applications for Asia";
- xxxv. Aftab Ahmad Khan participated in training workshop on Application of GIS and remote sensing on Agriculture in Pakistan, Arid University Rawalpindi 25-28 Mar 2016;

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

- i. Mir, K.A., and Balasubramanian, R. (2017). Air quality improvement and greenhouse gas mitigation in Pakistan: an integrated approach. In L. L.

Heng, N. Harvey, K. Sekhar, Y. W-Shan & S. J. Gek-khim (Eds.), Sustainability matters: environmental management in the Anthropocene (pp. 189 – 210). Singapore, SG: World Scientific Publishing. DOI: https://doi.org/10.1142/9789813230620_0007;

- ii. Shaukat Ali, Bushra Ghaffar, Kayyanat Shafiq, Jaziba Ishtiaq, Iqra Sarfraz, Nadia Khan, Muhammad Adnan, Aftab Ahmad Khan, Kaleem Anwar Meer, Firdos Khan, Muhammad Shahbaz and Muhammad Arif Goheer (2017) abstract on Future Changes in Drought Characteristics over Pakistan Using Standardized Precipitation Index (SPI): 1970-2099 published in the Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;
- iii. Muhammad Adnan and Nadia Rehman (2017) abstract on Climate extremes and desertification trends in context of climate change published in Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;
- iv. Kaleem Anwar and Shahbaz Mehmood (2017) abstract on Pakistan's Energy Sector's Greenhouse Gas Emissions published in the Proceedings of First International Conference on "Emerging Trends in Earth and Environmental Sciences" from 9-10 March 2017. College of Earth and Environmental Sciences, University of the Punjab, Lahore;
- v. Muhammad Zia-ur-Rahman Hashmi and Qurat ul Ain Ahmad (2016). Mid-term progress report of Year-II. APN Project "Runoff Scenarios and Water Based Adaptation Strategies in South Asia" (ARCP2013-20NMY-Shrestha);
- vi. Nuzba Shaheen and Muhammad Arif Goheer (2016) Proceedings of the Regional Training Workshop on 'Use of Statistical Downscaling and AquaCrop Simulation Modeling Tools for Climate Change Impact Studies' organized under APN Project on Climate Smart Agriculture through Sustainable Water Use Management' 30 May – 04 June 2016, Kandy, Sri Lanka.

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

- i. 1st Stakeholders' Consultative Meeting on Pakistan's Glaciers Threats Study, GCISC, Islamabad, Mar 10, 2017;
- ii. GCISC organized a Spring Tree Plantation Campaign 2017 under Prime Minister's Green Pakistan Program at Emigration Tower in collaboration with D.G Bureau of Emigration & GCISC-9 Feb 2017;
- iii. Pak-INDC Steering Committee Meeting organized jointly by MoCC and GCISC on October 27, 2016, Islamabad;
- iv. Stakeholder Consultation on Pakistan INDC Study organized jointly by GCISC & MoCC on 29 August 2016, Islamabad;

- v. Pak-INDC Steering Committee Meeting organized jointly by MoCC and GCISC on September 19, 2016, Islamabad;
- vi. Organized a meeting of Sector Experts contributing to Pak-INDC study on August 17, 2016, Islamabad.

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

- i. Muhammad Ijaz, First Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, 12-14 June 2017, Bilbao, Spain;
- ii. Muhammad Arif Goheer, participated in 1st Lead Author Meeting (LAM1) for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories; 7-9 June 2017, Bilbao, Spain;
- iii. Qurat-ul-Ain Ahmad, HI-AWARE PhD Academy, 21-25 November 2016, Kathmandu, Nepal;
- iv. Aftab Ahmad Khan participated in International Conference & Exhibition “Advanced Geospatial Science & Technology” held from 18-20 October 2016 at Tunis, Tunisia;
- v. Muhammad Ijaz, Workshop on the Building of Sustainable National GHG Inventory Management Systems, and the use of the 2006 IPCC Guidelines for National GHG Inventories for the Asia-Pacific and Eastern European Regions, 5-9 September 2016, South Korea;
- vi. Muhammad Amjad, APCC Training Program 2016 on “Generation of Regional Climate Data derived from Statistical Downscaling Techniques” being organized by Asia-Pacific Economic Cooperation Climate Centre (APCC), 22-27 August 2016, Busan, South Korea;
- vii. Shahbaz Mehmood participated in Understanding Climate Change and Enabling Climate Actions with a Special Focus on Mountain Systems of the Hindu Kush Himalayas, 11-13 April 2017, Kathmandu, Nepal;
- viii. Nuzba Shaheen participated in 4th SEACLID/CORDEX Southeast Asia Project Workshop and Empirical-Statistical Downscaling (ESD) for CORDEX Asia, 23-25 November 2016, Hanoi, Vietnam;
- ix. Muhammad Arif Goheer participated in the in the 22nd Session of Conference of Parties (COP-22) as a Government delegate from 7-18 November 2016, Marrakesh, Morocco;
- x. Nadia Rehman, Our Planet: Addressing Regional Effects of Extreme Weather Events, 4-25 March 2017, USA.

- 12. Effort on capacity building of GCISC young scientists through academic and specialized trainings and participation conferences, workshops etc at National level (35):**
- i. Muhammad Arif Goheer - Consultation as INDC Roadmap Preparation at MoCC on 12 July, 2016;
 - ii. Muhammad Zia-ur-Rahman Hashmi & Aftab Ahmad Khan participated in Short Course on "Remote Sensing and GIS Training on Flood Modelling", NUST H-12 Sector Campus, Islamabad, 18 - 29 July 2016;
 - iii. Muhammad Amjad - Second Learning Session on Urban Resilience Under the 2016 LEAD Leadership Development Programme (LDP) on 25-29 July 2016 at Karachi;
 - iv. Muhammad Zia-ur-Rahman Hashmi - Meeting of Disaster Risk Management Implementation Committee – Climate Change Division on 23 August 2016 Conference Room (220-E)-NDMA;
 - v. Muhammad Arif Goheer, Shahbaz Mehmood, Muhammad Ijaz & Kaleem Anwar Mir participated in Stakeholders Consultation Workshop on Pakistan INDC Study at Marriott Hotel Islamabad on 29 August 2016;
 - vi. Aftab Ahmad Khan-APSIM Training, Agriculture University Faisalabad on 28-30 August 2016;
 - vii. Muhammad Arif Goheer & Shahbaz Mehmood - Talk by Prof. Bothum on "Climate Change and the changing monsoon pattern at COMSTECH on 07 September 2016;
 - viii. Muhammad Arif Goheer - Consultative Workshop on Legal Preparedness for REDD+ at FAO Office Islamabad, 29 September 2016;
 - ix. Muhammad Arif Goheer - INDC Steering Committee Meeting at MoCC on 5th October 2016;
 - x. Aftab Ahmad Khan - Fall School on Water Science, Governance and Policy at LUMS on 7-9 November 2016;
 - xi. Muhammad Arif Goheer - Meeting of National Working Groups on REDD+ at Grand Regency Hotel Islamabad on 22-23 November 2016;
 - xii. Muhammad Amjad - SDPI's Nineteenth Sustainable Development Conference (SDC) at Marriott Hotel Islamabad on 6-8 December 2016;
 - xiii. Shahbaz Mehmood & Qudsia Zafar - 1st International PAEC-CIRP Joint Seminar on "Atmospheric Dispersion of Effluents and Radiological Consequences Assessment for Single & Multiple Units NPPs at PNRA HQ on 03-05 January 2017;
 - xiv. Muhammad Arif Goheer - Consultative Workshop on University-Industry Collaborative Interactions: Policy and Practical Implications for Pakistan at PCST on 4th January 2017;
 - xv. Muhammad Zia-ur-Rahman Hashmi - Consultative Workshop on Impact of Climate Change on Water Resources of Pakistan and Mitigation Options on 11 January 2017 at PEC HQs Islamabad;

- xvi. Muhammad Arif Goheer - LEAD Pakistan National Consultation on Pakistan Water Challenge at Marriot Hotel, Islamabad on 8 February 2017;
- xvii. Syed Mehmood Nasir, Muhammad Arif Goheer & Muhammad Zia-ur-Rahman Hashmi - Pakistan's Glacier Threats Study at MoCC on 14-15 February 2017;
- xviii. Muhammad Arif Goheer - Inception Workshop for REDD+NFMS/MRV/FREL/FRL and REDD+ Strategy Development and Implementation Framework at Hill View Hotel, Islamabad on 13-14 February 2017;
- xix. Muhammad Arif Goheer, Shahbaz Mehmood & Ms. Qudisia Zafar - "Stakeholders Workshop on Forests, Biodiversity, Climate Change and Ecosystem Service for USAID Strategic Planning" at Serena Hotel, Islamabad on 15 February 2017;
- xx. Muhammad Adnan, Shaukat Ali & Kaleem Anwar Mir - First International Conference on Emerging Trends in Earth and Environmental Sciences (ETEES17) on 08-10 March 2017 at Lahore;
- xxi. Shahbaz Mahmood & Muhammad Zia-ur-Rahman Hashmi - Visit of Expert Team from International Centre for Water Hazard and Risk Management (ICHARM), Japan to PMD at PMD Islamabad on 2-3 March 2017;
- xxii. Muhammad Arif Goheer, Shahbaz Mehmood & Muhammad Zia-ur-Rahman Hashmi - Meeting on Pakistan's glacier threats study at Committee Room on 10 March 2017;
- xxiii. Shaukat Ali - One Day Symposium "Advances in Earth Sciences and Climate Change" at Abbottabad University of Science and Technology (AUST) on 20 March 2017;
- xxiv. Muhammad Arif Goheer & Muhammad Amjad - LEAD-Invitation for national workshop on 'Forging Partnerships for Climate Compatible Development in Pakistan at Marriot Hotel, Islamabad on 21 March 2017;
- xxv. Muhammad Zia-ur-Rahman Hashmi - PCRWR "National Experts Consultative workshop on Integrated water resource management and rain water harvesting in Punjab Barani Tract" at PCRWR, Islamabad on 27 March 2017;
- xxvi. Muhammad Arif Goheer - GCISC presentation in the Radio Pakistan programmes on the topic of climate change at Radio Pakistan on 28 March 2017;
- xxvii. Muhammad Arif Goheer - Conference on 'Contemporary Issues in Biosciences at University of Wah, Wah-Cantt on 29 March 2017;
- xxviii. Muhammad Arif Goheer & Muhammad Ijaz - Review of Greenhouse Gas Emission Inventory of Pakistan for the Year 2014-15 at FAO Office Islamabad on 12 April 2017;
- xxix. Amjad Masood - Seminar on "Managing Indus Basin for Sustainable Development, Food Security and Poverty Alleviation" at UET, Lahore on 13 April 2017;

- xxx. Syed Mehmood Nasir, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi & Shahbaz Mehmood - Meeting with LEAD Pakistan team to discuss the USAID-PEER project on the Kabul River Basin at IG (Forests) MoCC on 18 April 2017;
- xxxi. Muhammad Arif Goheer - 8th National Farmers Convention at Pakistan Academy for Rural Development Peshawar from 26-28 April 2017;
- xxxii. Muhammad Arif Goheer - Executive Development Institute of the National School of Public Policy – Lahore Leadership & Governance in Food Security at Lahore on 08-12 May 2017;
- xxxiii. Muhammad Zia-ur-Rahman Hashmi - Climate Vulnerability Assessment and Adaptation of Water Systems at USPCASW, MUET, Jamshoro on 11-12 May 2017;
- xxxiv. Shaukat Ali, Nuzba Shaheen & Aftab Ahmad Khan - One-Day Workshop on Hydrologic Modeling Using HEC-HMS at PCRWR on 15 May 2017;
- xxxv. Muhammad Zia-ur-Rahman Hashmi - PCRWR – Plenary Workshop on “Inter – Provincial Water” Pakistan’s Water Apportionment Accord 1191: 25 Years at Marriot, Islamabad on 17 May 2017.

13. Contributions to Research Projects (3):

- i. UNEP Project on Preparation of Intended Nationally Determined Contributions (INDC) to the 2015 Agreement under the United Nations Framework Convention on Climate Change (GFL-5070-2724-4F36-2207);
- ii. APN Project on “Runoff Scenarios and Water Based Adaptation Strategies in South Asia” (ARCP2013-20NMY-Shrestha);
- iii. Contributing to Pakistan: enabling Activities for the Preparation of Pakistan’s Second National Communication (SNC) under United Nations Framework Convention to Climate Change, Project funded by UNEP and Lead by Ministry of Climate Change.

14. Mass Awareness / Media Appearance:

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

15. Contribution to Key International/ National Reports:

- Six GCISC scientists Contributed for different chapters of UNEP GEO-6 Asia-Pacific Region component;
- Two GCISC scientists contributed to 2019 Refinement to 2006 IPCC Guidelines for the preparation of Greenhouse Gas Inventories;
- Coordinated and contributed to Pakistan-Intended Nationally Determined Contribution (PAK-INDC) study Project executed by Ministry of Climate Change through GCISC.

16. Other Important Assignments:

General Administrative/ Technical Functioning:

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