

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

## **Performance Report 2017-18**

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 modeling to predict the impact of projected changes in temperature, precipitation, and water availability, Forestry, Land Use
- b. **Capacity building:** imparting technical and communication skills to GCISC staff as well as students and climate scientists at other national research organizations and universities.

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

### **3. Ongoing Research Activities**

#### **I. Climatology & Environment Section**

- Assessment of past climate trends over Pakistan and its various sub regions using statistical analysis techniques;
- Development of future climate projections for Pakistan based on:
  - i). Post processing and analysis of the outputs of CMIP5 Global Circulation Models (GCMs) from IPCC-AR5
  - ii). High resolution climate scenarios by dynamical downscaling the data sets of coarse resolution GCMs using state-of-the-art regional climate models (RCMs)
  - iii). Employing statistical downscaling techniques for station based scenarios.
- Study the extreme climate and weather events using simulation models and development of indicators and indices for climate extremes over Pakistan. Development of methodological tools for projecting future frequency & intensity patterns of extreme events;
- Development of seasonal, inter-annual and decadal climate predictability systems; Predictability of Asian Summer Monsoon System;
- Updating of GHG Inventory of Pakistan using latest Intergovernmental Panel on Climate Change (IPCC) guidelines.

#### **II. Water Resources & Glaciology Section**

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

#### **III. Agriculture, Forestry and Land Use Section**

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

#### 4. Achievements and Progress of GCISC:

Since its inception, GCISC has produced over 148 scientific papers and official reports, collaborated with national and international institutions, contributed to the work of prestigious international scientific panels, and provided advice to the government on national policies as well as international commitments.

The following is a summary of the accomplishments in 2017-18. In case of joint authorship, the name of the GCISC researcher is in **bold** script.

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

- i. **Nadia Rehman, Muhammad Adnan and Shaukat Ali** (2018), "Assessment of CMIP5 climate models over South Asia and climate change projections over Pakistan under representative concentration pathways" *International Journal of Global Warming (IJGW)*, 16(4), DOI: [10.1504/IJGW.2018.095994](https://doi.org/10.1504/IJGW.2018.095994);
- ii. Ilmas, B., **Mir, K.A.**, & Khalid, S. (2018) Greenhouse gas emissions from the waste sector: a case study of Rawalpindi in Pakistan. *Carbon Management*, 1-10. DOI: <https://doi.org/10.1080/17583004.2018.1530025>;
- iii. **Zafar Q**, Zafar S, Holben B (2018): Seasonal assessment and classification of aerosols transported to Lahore using AERONET and MODIS deep blue retrievals. *Int. J. Climatol.* 38: 1022–1040;
- iv. Khalid, B., Bueh, C., Javeed, **Shaukat Ali**, S., Sultana, Q., & Khalid, A. (2018). The application of a single-model ensemble system to the seasonal prediction of winter temperatures for Islamabad and Lahore using coupled general circulation models. *Weather*, 73(5), 159-164;

- v. Gul, C., Puppala, S. P., Kang, S., Adhikary, B., Zhang, Y., **Shaukat Ali.**, Li, Y., and Li, X. (2018). Concentrations and source regions of light-absorbing particles in snow/ice in northern Pakistan and their impact on snow albedo. *Atmospheric Chemistry and Physics*, 18(7), 4981-5000;
- vi. Khan, F., **Shaukat Ali.**, & Pilz, J. (2018). Evaluation of statistical downscaling models using pattern and dependence structure in the monsoon-dominated region of Pakistan. *Weather*, 73(6), 193-203;
- vii. Gong, Z., **Dogar, M. M.**, Qiao, S., Hu, P., & Feng, G. (2018). Assessment and correction of BCC\_CSM's performance in capturing leading modes of summer precipitation over North Asia. *International Journal of Climatology*, 38(5), 2201-2214;
- viii. **Amjad Masood, Muhammad Zia ur Rahman Hashmi, Haris Mushtaq.** (2018). Spatio-Temporal Analysis of Early Twenty-First Century Areal Changes in the Kabul River Basin Cryosphere, *Earth Systems and Environment* (2018) 2:563–571 <https://doi.org/10.1007/s41748-018-0066-6>;
- ix. Khaled S. Balkhair, **Amjad Masood**, Mansour Almazroui, Khalil Ur Rahman, Omar A. Bamaga, Ahmed S. Kamis, Iqbal Ahmed, Mohammed I. Al-Zahrani, K. Hesham, Groundwater share quantification through flood hydrographs simulation using two temporal rainfall distributions, *Desalination and Water Treatment* 114 (2018) 109-119, doi:10.5004/dwt.2018.22346;
- x. **M. Adnan, N. Rehman, S. Ali, S. Mehmood, K. A. Mir, A. A. Khan** and B. Khalid, "Prediction of Pakistan Summer Rainfall from Global SST and SLP", *Weather*, 2017, 72(3), <https://doi.org/10.1002/wea.2784>;
- xi. Muhammad, J., **M. Adnan**, I. Din, **A. A. Khan**, W. Ali and S. Jehan, "Temperature Trend Analysis using Non-linear Regression of Kohat, Northwestern Pakistan", *Pakistan Journal of Meteorology*, 2017, 14(27);
- xii. Khan, F., Pilz, J., & **Shaukat Ali.** (2017). Improved hydrological projections and reservoir management in the Upper Indus Basin under the changing climate. *Water and environment journal*, 31(2), 235-244;
- xiii. Gul, C., Kang, S. C., Ghauri, B., Haq, M., Muhammad, S., & **Shaukat Ali.** (2017). Using Landsat images to monitor changes in the snow-covered area of selected glaciers in northern Pakistan. *Journal of Mountain Science*, 14(10), 2013-2027;
- xiv. **Dogar, M. M.**, Kucharski, F., & Azharuddin, S. (2017). Study of the global and regional climatic impacts of ENSO magnitude using SPEEDY AGCM. *Journal of Earth System Science*, 126(2), 30;
- xv. **Dogar, M. M.**, Stenchikov, G., Osipov, S., Wyman, B., & Zhao, M. (2017). Sensitivity of the regional climate in the Middle East and North Africa to volcanic perturbations. *Journal of Geophysical Research: Atmospheres*, 122(15), 7922-7948;

- xvi. Gong, Z., **Dogar, M. M. A.**, Qiao, S., Hu, P., & Feng, G. (2017). Limitations of BCC\_CSM's ability to predict summer precipitation over East Asia and the Northwestern Pacific. *Atmospheric research*, 193, 184-191;
- xvii. Ramzan M., Ham S., **Amjad M.**, Chang E., Yoshimura K., (2017) "Sensitivity evaluation of convective parameterizations and spectral nudging schemes in historical dynamical downscaling for South Asia" Volume 2017, Article ID 7560818, 20 pages in *Advances in Meteorology*. (<https://doi.org/10.1155/2017/7560818>);
- xviii. K. Ullah, M. Idrees, Z. Mahmood, T. Iqbal, S. Muhamad. H.Haq, **A.Ahmad**, S.Hussain. 2017. Response of Yield and Related Attributes of Upland Cotton to Weather Variables, *American Journal of Plant Sciences*, 2017, 8, 1711-1720. <http://www.scirp.org/journal/ajps>, ISSN Online: 2158-2750, ISSN Print: 2158-2742;
- xix. **M. Adnan, Rehman, N., Ali, S., Mehmood, S., Mir, K. A., Khan, A. A.** and Khalid, B. (2017). Prediction of summer rainfall in Pakistan from global sea-surface temperature and sea-level pressure. *Weather*,72:76–84. doi:10.1002/wea.2784;
- xx. J. Muhammad, **M. Adnan, A. A. Khan**, W. Ali and S. Jehan. 2017. Temperature Trend Analysis using Non-linear Regression of Kohat, North Western Pakistan". *Pakistan Journal of Meteorology*. Vol. 14, Issue 27: Jul, 2017;
- xxi. M. Abdullah, S. Malik, M. D. Siddiqui and **A. A. Khan**. 2017. Satellite Derived Surface Temperature Fronts in Relation to Tuna Catch in EEZ of Pakistan. *Pakistan Journal of Engineering Technology and Science (PJETS)*, Volume 7(1):19-31.

## 6. Technical Research Reports (7):

- i. Final Report "Runoff Scenario and Water Based Adaptation Strategies in South Asia," *APN E-Lib*, accessed July 18, 2019, <http://www.apn-gcr.org/resources/files/original/b5fd5307612c241f327a9c12ce7da648.pdf>;
- ii. Kaleem Anwar Mir (2018). Air Quality Improvement and Greenhouse Gas Mitigation in Pakistan: An Integrated Approach" by National University of Singapore as a chapter in the book - Sustainability Matters Vol. VI;
- iii. Mir, K. a., M. Ijaz, M. A. Goheer and S. Mehmood. 2018. Greenhouse Gas Inventory of Pakistan for the year 2014-15, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;
- iv. Enoki, T., Mwakasonda, S., Mir, K.A., Hyde, B., Federici, S., and Chiemchaisri, C. (2017). Report on the individual review of the annual submission of Malta FCCC/ARR/2016/MLT, *United Nations Office at Geneva*, Geneva, Switzerland. DOI: <http://unfccc.int/resource/docs/2017/arr/mlt.pdf>;
- v. Technical report on the 'Pakistan's Current Mitigation Effort' (2017) submitted to Prime Minister of Pakistan, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;

- vi. Mid Term Technical Report of APN-CSA Project (2017) The report of the Project on Climate smart agriculture through sustainable water use management: Exploring new approaches and devising strategies for climate change adaptation in South Asia submitted to Asia Pacific Network for Global Change Research, Global Change Impact Studies Centre (GCISC), Islamabad, Pakistan;
- vii. External Review of various chapters of ICIMPOD Hindukush Himalayan Monitoring and Assessment Programme Report by GCISC's scientists.

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

- i. Muhammad Zia-ur-Rahman Hashmi, Inception Workshop of the NSFC-ICIMOD Project "Glacier changes and associated hydrologic impact under warming climate in Hunza Valley along the Sino-Pakistan Economic Corridor", 21-27 June 2018, China;
- ii. Kaleem Anwar Mir, participated as a trainee in "2018 UNFCCC-GIR-CASTT Programme on Greenhouse Gases", offered in collaboration by the GIR and UNFCCC, 25 June-19 July 2018, South Korea;
- iii. Mubashar Dogar, ICTP Summer School on "Theory Mechanisms and Hierarchical Modelling of Climate Dynamics: Multiple Equilibria in the Climate System, 25 June-05 July 2018, Italy;
- iv. Muhammad Adnan, IPCC First Lead Author Meeting for 6th Assessment Report, 25-29 June 2018, China;
- v. Muhammad Amjad, IPCC First Lead Author Meeting for 6th Assessment Report, 25-29 June 2018, China;
- vi. Shaukat Ali, Abdus Salam International Centre for Theoretical Physics (ICTP), 27 May-04 August 2018, Italy;
- vii. Muhammad Adnan, IPCC Expert Meeting on assessing Regional Climate Information, 16-18 May 2018, Italy;
- viii. Muhammad Amjad, Intergovernmental Panel on Climate Change (IPCC) Expert Meeting on Assessing Climate Information for Regions (smr H545), 16-18 May 2018, Italy;
- ix. Muhammad Amjad, Heinrich Boll Stiftung (HBS) Visiting Program on Energy Transition, 23-27 April 2018, Germany;
- x. Muhammad Arif Goheer, Third Lead Author Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories, 10-13 April 2018, Australia;
- xi. Muhammad Ijaz, Third Lead Author Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories, 10-13 April 2018, Australia;
- xii. Aftab Ahmed Khan, Training on Water & Sedimentation Modeling, 12-16 February 2018, Davis, California, USA;

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

- xxix. Nuzba Shaheen, 2017 APEC Climate Center Training program on "User-oriented Statistical Downscaling of Climate Information in Agriculture and Water Resources", 16-26 August 2017, South Korea;
- xxx. Amjad Masood, Regional Workshop on Himalayan GEOS, 10-11 August 2017, Nepal;
- xxxi. Muhammad Zia-ur-Rahman Hashmi, Knowledge Forum on Indus Basin "The Indus Basin: New Knowledge Frontiers for Development and Resilience", 04-06 July 2017, Sri Lanka.

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

- i. Muhammad Arif Goheer delivered a presentation on Pakistan' Nationally Determined Contributions in the Workshop on Climate Resilient Development organized jointly by Ministry of Planning, Development and Reforms and Ministry of Climate Change, 29 June 2018 Islamabad
- ii. Muhammad Arif Goheer delivered a presentation on Climate Change Impacts: Adaptation and Mitigation Strategies in International workshop on "Options for an Energy Mix: issue of cost & sustainability by COMSTECH Secretariat- 26-28 Jun 2018;
- iii. Muhammad Zia-ur-Rahman Hashmi, delivered a seminar as a guest speaker 'Climate Vulnerability Assessment and Adaptation of Water Systems' held on April 27, 2018 at USPCASW, MUET, Jamshoro;
- iv. Tariq Banuri delivered a keynote address on Climate Change at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
- v. Muhammad Arif Goheer delivered presentation on Climate Change: Impacts and Adaptation Prospects at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
- vi. Muhammad Zia-ur-Rahman Hashmi delivered presentation on Climate Change and its impacts on water resources of Pakistan at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
- vii. Shahbaz Mehmood delivered a presentation on Climate Change Projections at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
- viii. Muhammad Arif Goheer delivered presentation on Climate Change: Pakistan's Nationally Determined Commitments at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 27 March 2018;
- ix. Tariq Banuri, "Preparing rural communities to cope with climate change through South-South and Triangular Cooperation" by IFAD with GCISC assistance at Serena Hotel Islamabad on 14 Mar 2018;



- x. Muhammad Arif Goheer, Session on Climate Change and Food Security, preparing rural communities to cope with climate change through South-South and Triangular Cooperation” by IFAD with GCISC assistance at Serena Hotel Islamabad on 14 Mar 2018;
- xi. Shaukat Ali delivered talk on Future Climate Changes over Pakistan using Global & Regional Climate Models as Keynote Speaker in the 1st International Conference on Climate Change impacts on Agriculture and Food supply (IC3AF-2018), Swabi University;
- xii. Muhammad Arif Goheer delivered a Keynote presentation on Climate Change and Food security issues in Pakistan in inception workshop under APN Project on Sustainable Watershed Management organized by Pakistan Agricultural Research Council from 27 - 29 December 2017, Islamabad;
- xiii. Pakistan Country Report on Improving Skills for Promoting Sustainable Watershed Management Practices in South Asia” December 26 – 28, 2017;
- xiv. Muhammad Adnan, Nadia Rehman and Shahbaz Mehmood, Assessment of observed Rainfall and Temperature Trends over Pakistan for period (1961-2015)”, in Science-Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;
- xv. Muhammad Arif Goheer participated in and delivered a presentation on Pakistan' NDCs to UNFCCC in Science-Policy Conference on Climate Change organized by Global Change Impact Studies Centre from 18-20 December 2017, Islamabad;
- xvi. Muhammad Adnan, Nadia Rehman and Shahbaz Mehmood, Intra & Inter-Annual Variability and Predictability of Rainfall over Monsoon Region of Pakistan”, in Science-Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;
- xvii. Kaleem Anwar Mir and Shahbaz Mehmood, Assessment of current and projected trends in carbon dioxide emissions from energy sector of Pakistan. Poster presented at the first international Science Policy Conference on Climate Change (SP3C), December 18-20, 2017, Islamabad;
- xviii. Kaleem Anwar Mir and Shahbaz Mehmood, A fact sheet on greenhouse gas emissions from Pakistan. Poster presented at the first international *science policy conference on climate change (SP3C)*, December 18-20, 2017, Islamabad;
- xix. Rida Sehar Kiyani, Romaisa Babar, Sana Nasir, Bushra Khalid, Shaukat Ali, Muhammad Adnan, Analysis of Temporal Variability in the Onset of Summer Monsoon in Pakistan. in Science Policy Conference on Climate Change (SP3C), Islamabad, 18-20 December 2017, Islamabad;
- xx. Muhammad Amjad, Evaluation of Regional Spectral Model (RSM) for Prediction of Summer Monsoon over South Asia” at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;

- xxi. Amjad M, Fath B, Rovenskaya E (2017) “Ecological Network Model and Analysis for Rawal Lake, Pakistan” at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;
- xxii. Ramzan M, Ham S, Amjad M, Chang E and Yoshimura K (2017) “Present and Future climate projections of South Asian surface precipitation using Dynamical Downscaling method” at Science Policy Conference on Climate Change (SP3C) organized by GCISC and Partners during 18-20 December 2017, Islamabad;
- xxiii. Aftab Ahmad Khan, Inter periodical Comparison of Climate Induced Changes on Crop Water Requirements and Net irrigation Requirements of wheat and maize in D.I. Khan, Southern KPK, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxiv. Aftab Ahmad Khan, Farmers Perception on Climate Change in Bajaur Agency, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxv. Aftab Ahmad Khan and Sher Shah Hassan, The impact of climatic variability on the riparian ecosystem on Qualitative scale in stressed Ecosystem of Kanshi basin of Mangla Watershed, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxvi. Aftab Ahmad Khan, Paper presentation on Appraisal of Irrigation System Performance Using Remote Sensing and GIS Techniques, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxvii. Aftab Ahmad Khan and Sher Shah Hasan, Water Resource Project Assessment under Climate Change and Water Withdrawals Uncertainties: Case of Nari River, Baluchistan, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxviii. Aftab Ahmad Khan, Impact of the Climate Change on Crop Water Requirements Under RCPs for End-Century in Dera Ismail Khan, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Islamabad;
- xxix. Muhammad Zia-ur-Rahman Hashmi, Discussion on Water-related Disasters and Hydrological Changes, 15 December 2017;
- xxx. Aftab Ahmad Khan and Muhammad Arif Goheer, CROPWAT based projection of wheat crop under changing climatic conditions in Punjab, Pakistan in International Conference on Climate Change Threats to Agriculture and Food Security, THINK-ADAPT, November 22-24, 2017, Agriculture University Peshawar;
- xxxi. Aftab Ahmad Khan, Muhammad Arif Goheer and Muhammad Ijaz, Spatial and Temporal analysis of surface salinity in Lakki Marwat using geo spatial approaches in International Conference on Climate Change Threats to Agriculture and Food Security, THINK-ADAPT, November 22-24, 2017, Agriculture University Peshawar;

- xxxii. Tariq Banuri delivered a keynote presentation on Climate Change and Pakistan speaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;
- xxxiii. Muhammad Arif Goheer delivered a presentation on Climate Change and Agriculture: Impacts and Adaptation Prospects speaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;
- xxxiv. Muhammad Zia-ur-Rahman Hashmi, Climate change and water resources of Pakistan speaker at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;
- xxxv. Shahbaz Mehmood, Climate Change; Evidence, past trends and future projections”, at One-day workshop on Climate Change organized by National School for Public Policy, Lahore – 23 October 2017;
- xxxvi. Muhammad Arif Goheer participated in and gave a briefing on Work related to second National Communication, organized by MOCC and NEECA, 5 October 2017, Islamabad;
- xxxvii. Aftab Ahmad Khan, An Introduction to 1-D and 2-D Hydraulic Analysis Using HEC-RAS, Technical Training Workshop on 24 August, 2017 at NARC Islamabad;
- xxxviii. Muhammad Arif Goheer delivered presentation on Greenhouse Gas Emissions from Agriculture, Forestry and Land Use Sector in the Workshop on Greenhouse Gas Inventories organized by Global Change Impact Studies Centre in collaboration with CfRN under CfRN RRR+ Project on 17 July 2017, Islamabad;
- xxxix. Arif Goheer delivered presentation on Pakistan’s Reporting to UNFCCC in the Workshop on Greenhouse Gas Inventories organized by Global Change Impact Studies Centre in collaboration with CfRN under CfRN RRR+ Project on 17 July 2017, Islamabad;
- xl. Shaukat Ali, provided hands-on training to scientific staff of Pakistan Forest Institute (PFI) on climate data downloading, analysis and modeling in the project titled “Studies of tree ring features of some conifers in relation to climate change”.

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

- i. Mir, K.A. (2018). Sectoral emission inventory of air pollutants in Punjab. In D. Muchoney, P. Moore, G. Franceschini, M. Ali, M. A. Goheer, S. Mehmood & A. Pervaiz (Eds.), *Remote Sensing for Spatio-Temporal Mapping of Smog in Punjab and Identification of the Underlying Causes Using GIS Techniques (R-SMOG)* (pp. 62 – 73). Pakistan, PK: Food and Agriculture Organization of the United Nations (FAO);
- ii. Mir, K.A., and Balasubramanian, R. (2017). Air quality improvement and greenhouse gas mitigation in Pakistan: an integrated approach. In L. L. Heng, N. Harvey, K. Sekhar, Y. W-Shan & S. J. Gek-khim (Eds.),

Sustainability matters: environmental management in the Anthropocene (pp. 189 – 210). Singapore, SG: World Scientific Publishing. DOI: [https://doi.org/10.1142/9789813230620\\_0007](https://doi.org/10.1142/9789813230620_0007);

- iii. Aftab Ahmad Khan, Muhammad Arif Goheer, Nuzba Shaheen, Tauqeer Qadir, Shaukat Ali and Muhammad Ijaz (2017) CROPWAT based future projection of crop water and net irrigation requirements for wheat in semi-arid and arid environment of Pakistan under changing climatic conditions in Punjab, Published in the Abstract Book of the International Conference on Climate Change Threats to Agriculture and Food Security, Think-Adapt 2017, November 22-24, 2017, Peshawar;
- iv. Aftab Ahmad Khan, Tauqeer Qadir, Muhammad Arif Goheer, Muhammad Ijaz and Saddam Hussain (2017) Assessment of Spatial and Temporal Variations of Soil Salinity using Combination of Remote Sensing and Field Methods in Lakki Marwat, KPK. Published in the Abstract Book of the International Conference on Climate Change Threats to Agriculture and Food Security, Think-Adapt 2017, November 22-24, 2017, Peshawar;
- v. Amina Akif, Dr Sherazi, Akif Rahim, Aftab Ahmed Khan, Numan Kashif, The statistical approach to assessment the Hydrological Alternation in The Mangla Watershed of Pakistan, Proceedings THINK-ADAPT, November 22-24, 2017, at Agriculture University Peshawar;
- vi. M. Amin, Aftab Ahmed Khan, Abida Perveen, Sher Shah and Zareen Raf, Drought Risk Assessment: A Case Study of Dry Lands, Proceedings THINK-ADAPT, November 22-24, 2017, at Agriculture University Peshawar;
- vii. Muhammad Waqar Azeem, Ashfaq Ahmad, Jamshad Hussain, Muhammad Mubashar, Aftab Ahmad and Muhammad Awais, Impacts of Climate Change on Agriculture System of Pakistan;
- viii. Climate Change and its Impact on Cotton (*Gossypium* sp.) in Pakistan, Proceedings Sino-Pak international conference on innovations in cotton breeding and Biotechnology 22-24 November 2017, University of Agriculture Multan.

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

- i. ***Organization of Pakistan's largest climate conference*** On December 18-20, 2017, GCISC organized the Science Policy Conference on Climate Change (SP3C-2017) in Islamabad. For this Conference, GCISC partnered with the COMSATS, the Higher Education Commission (HEC), the University of Utah - USA, the US-Pakistan Centre for Advanced Studies in Water at Mehran University of Engineering and Technology, Jamshoro (USPCAS-W), the Pakistan Meteorological Department (PMD), the National Disaster Management Authority (NDMA), the Sustainable Development Policy Institute (SDPI), and the Heinrich Böll Stiftung (HBS). The Conference was attended by more than 850 participants representing international and national research organizations, academia, government, media, law, parliamentarians and civil society. The Conference comprised

of 45 technical research workshops arranged in 5 parallel sessions covering the themes on Climate Science, Climate & Water, Agriculture & Food Security, Impacts & Adaptation and Mitigation & Policy. The purpose of research workshops was to provide a platform to young researchers to present their latest research findings. Overall, 140 scientific papers were presented in these research workshops. In addition to this, roundtables & side events (9 each), a poster competition and an exhibition were also part of the SP3C 2017. The roundtables and stakeholder side events were chaired by parliamentarians, secretaries to Govt. of Pakistan, eminent scientists and academicians. Many well-known researchers from different universities and research institutions shared their knowledge and research findings on the themes mentioned above;

- ii. Organized a session on Climate Change and Its Implications for Pakistan at National School of Public Policy, 27 March 2018, Lahore.
- iii. Organization of National seminar on "Preparing Rural Communities to Cope With Climate Change through South-South and Triangular Cooperation" jointly by GCISC/MoCC and IFAD on March 14, 2018, Islamabad;
- iv. Organization of meeting on Climate Research and Outreach Agenda for the year 2018, 19 January 2018, Islamabad;
- v. Organized a session on Climate Change and Its Implications for Pakistan at National School of Public Policy, 23 October 2017, Lahore;
- vi. Organization of Joint NCP-GCISC Workshop on Introduction of Degree Program on Atmospheric Sciences/ Earth System Physics in Universities, 14 September 2017, Islamabad;
- vii. Organization of a meeting of University Consortium jointly with Higher Education Commission, August 08, 2017, Islamabad;
- viii. Field Assessment for climate change adaptation at local level in the Gilgit watershed at Gilgit from 19-26 July, 2017;
- ix. Organization of National Workshop on Greenhouse Gas Inventories under CfRN Reporting for Results based REDD+ project, Serena Hotel, 18 July 2017, Islamabad;

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

- i. Muhammad Arif Goheer, Meeting of the committee on Water organized by Ministry of Water Resources, 29 June 2018
- ii. Shahbaz Mehmood-Workshop on progress of PSF-NSFC joint project at main conference hall, PMD Headquarter Office Title: Projection and Attribution of Stream Flow Composition at Mountain Rivers in China and Pakistan- 27-28 Jun 2018;
- iii. Amjad Masood-Workshop on progress of PSF-NSFC joint project at main conference hall, PMD Headquarter Office Title: Projection and Attribution of

- Stream Flow Composition at Mountain Rivers in China and Pakistan- 27-28 Jun 2018;
- iv. Muhammad Arif Goheer, workshop on Sustainable Food Systems under Climate Change in South Asia, June 26-28, 2018, Islamabad;
  - v. Muhammad Ijaz, International workshop on "Options for an Energy Mix: issue of cost & sustainability by COMSTECH Secretariat- 26-28 Jun 2018;
  - vi. Amjad Masood-Participation in International Conference and 6th Regional Technical Group Meeting (RTG-6) by NDMA- 20-22 Jun 2018;
  - vii. Muhammad Amjad, Participation in International Conference and 6th Regional Technical Group Meeting (RTG-6) by NDMA- 20-22 Jun 2018;
  - viii. Muhammad Zia-ur-Rahman Hashmi-High Level Meeting on State of research on GIS and Space Applications, Potential Uses and Impact by Planning Commission at HEC- 13 Jun 2018;
  - ix. Muhammad Arif Goheer and Muhammad Ijaz, Participation in Consultative Training Workshop for Validating FRELs & NFMS and design of REDD+ PES for Pakistan by REDD+ Coord, MoCC- 11-12 Jun 2018;
  - x. Amjad Masood - International Conference on Seawater Desalination for Water Supply and Agricultural Applications - Options for Pakistan at PPMI Islamabad on 24 May 2018;
  - xi. Shahbaz Mehmood, Nadia Rehman, Qudsia Zafar, Kaleem Anwar Mir & Mubashar Dogar-Participation in open house - NUST-SNS Department of Physics- 23 May 2018;
  - xii. Muhammad Arif Goheer, Consultative Roundtable on REDD+ organized by SDPI, 21 May 2018, Islamabad;
  - xiii. Muhammad Arif Goheer-Participation in Consultative meeting to review contents of Mitigation analysis chapter of Second National Communication by NEECA- 10 May 2018;
  - xiv. Muhammad Arif Goheer, Shahbaz Mehmood, Muhammad Ijaz and Kaleem Anwar Mir, Workshop on BUR1 Project, organized by Ministry of Climate Change, 9 May 2018, Islamabad
  - xv. Muhammad Arif Goheer-Workshop on Climate Resilient Development by Planning Commission, M/o Planning, Development and Reforms- 8 May 2018;
  - xvi. Amjad Masood, Participation in Training workshop on Flood Management through Flood Early Warning and Forecasting System" by UNESCO at Margala Hotel Islamabad - 2-4 May 2018;
  - xvii. Muhammad Zia-ur-Rahman Hashmi, Training Workshop on Collective Community Action for Eco-Watershed Mitigation to Floods and Drought" on 1-2 May, 2018, Margala Hotel Islamabad;
  - xviii. Aftab Ahmad Khan, Training on Climate Change and Disaster Risk Reduction at NARC Islamabad- 30Apr-4May 2018;

- xix. Muhammad Zia-ur-Rahman Hashmi-Participation in seminar as Guest Speaker "Climate Vulnerability Assessment and Adaptation of Water Systems" by MUET Jamshoro- 27 Apr 2018;
- xx. Muhammad Arif Goheer, 5th Meeting of the National Climate Change Policy Implementation Committee (NCCPIC) at MoCC – 17 Apr 2018;
- xxi. Shaukat Ali-Visit to Pakistan Forest Institute as Resource Person in study of Climate Change 12-13 Apr 2018;
- xxii. Aftab Ahmed Khan-Consultation workshops of the national REDD+ working groups for NFMS and FRELS, National REDD+ strategy, ESMF, FGRM and Capacity building on SIS- 10-13 Apr 2018;
- xxiii. Shahbaz Mehmood, Participated in Technical Session on OZONE2CLIMATE (O2C) Technology Roadshow & 25th Pakistan HVACR Expo & Conference -2018 by MoCC (National Ozone Unit)- 5-7 Apr 2018;
- xxiv. Aftab Ahmed Khan-Training on Satellite Land Monitoring Systems, organized by REDD+ in Islamabad from 13-15 March 2018;
- xxv. Muhammad Arif Goheer-Seminar on Preparing Rural Communities to Cope with Climate Change through South-South and Triangular Cooperation- 14 Mar 2018 organized by GCSIC, Ministry of Climate Change and IFAD, Islamabad;
- xxvi. Muhammad Arif Goheer-Consultative workshop on improving agriculture extension services in Pakistan organized by FAO from 8-9 March 2018, Islamabad;
- xxvii. Muhammad Arif Goheer, Pollutants inventory in a half day meeting on R-SMOG organized by FAO in Islamabad 28 February 2018;
- xxviii. Muhammad Arif Goheer gave a briefing on the Second National Communication in the meeting organized by NEECA and MoCC on 28 February 2018, Islamabad;
- xxix. Muhammad Arif Goheer participated in a workshop on 'Pakistan in 2047' organized jointly by World Bank and Sustainable Development Policy Institute on 26 February 2017 in Islamabad;
- xxx. Muhammad Zia-ur-Rahman Hashmi, Shahbaz Mehmood, Nuzba Shaheen, Muhammad Amjad and Shaukat Ali, International conference on "Climate Change Adaptation Policy and Science-CCAPS at PARC- 26-27 Feb 2018;
- xxxi. Muhammad Zia-ur-Rahman Hashmi, Amjad Masood & Aftab Ahmed Khan - United Nations/Pakistan/PSIPW 4th International Conference on Space Technology for Water Management hosted by SUPARCO on behalf of the Government of Pakistan at Serena Hotel Islamabad from 26 Feb to 02 Mar 2018;
- xxxii. Khalid Mahmood-Launching ceremony of commemorative stamp of green Pakistan Programme- 12 Feb 2018;
- xxxiii. Tariq Banuri, Muhammad Arif Goheer, Shahbaz Mehmood and Muhammad Zia-ur-Rahman Hashmi-Meeting on 'Climate Research & Outreach Agenda for 2018',19 Jan 2018;

- xxxiv. Amjad Masood-Workshop on Role of Ulema in Climate Change Awareness-28 Dec 2017;
- xxxv. Muhammad Arif Goheer and Aftab Ahmad Khan “Improving skills for promoting sustainable watershed management practices in South Asia” December 26-28, 2017 with NARC;
- xxxvi. All GCISC Technical Staff, Science Policy Conference on Climate Change (SP3C), on 18-20 December 2017, Marriot Islamabad;
- xxxvii. Muhammad Arif Goheer-4th Meeting of the National Climate Change Policy Implementation Committee (NCCPIC) at MoCC – 11 Dec 2017;
- xxxviii. All GCISC Technical Staff, Sustainable Development conference organized by Sustainable Development Policy Institute from 5-8 December 2017, Islamabad;
- xxxix. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, Training program on "Water Quality Management" at NCBI by PCRWR- 4-8 Dec 2017;
  - xl. Muhammad Amjad-1st Meeting of the Working Group on Physical Infrastructure and Energy for 12th Five Year Plan- 6 Dec 2017;
  - xli. Muhammad Ijaz and Aftab Ahmad Khan, Expert Meeting on Pakistan GCF Concept Note, “Transforming the Indus Basin with Climate Resilient Agriculture and Climate-Smart Water Management, 28 November, 2017 FAO, Islamabad;
  - xlii. Muhammad Arif Goheer participated in Consultative Dialogue Report Launching Ceremony organized by jointly by Ministry of Climate Change Civil Society Coalition for Climate Change on 26 October 2017, Islamabad;
  - xlili. Muhammad Ijaz, National Training of Trainers (ToT) on Satellite Land Monitoring System (SLMS)- 20-23 Nov 2017;
  - xliv. Kaleem Anwar Mir, Technical training workshop: Practical use of the Energy Sector Carbon Impact Modelling tool developed for the Ministry of Energy- 24-26 Oct 2017;
  - xlv. Tariq Banuri, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi and Shahbaz Mehmood, Joint NCP-GCISC Workshop on Introduction of Degree Program on Atmospheric Sciences/ Earth System Physics in Universities, 14 September 2017, Islamabad;
  - xlvi. Muhammad Zia-ur-Rahman Hashmi-Workshop on Hydraulic Analysis Using HEC-RAS by PCRWR at NARC, Islamabad 24 Aug 2017;
  - xlvii. Muhammad Arif Goheer, Mitigation experts working group meeting-technology needs assessment (TNA) Islamabad by MoCC- 15 Aug 2017;
  - xlviii. Muhammad Arif Goheer, Fourth meeting of national REDD+ working groups by MoCC & REDD+- 7-8 Aug 2017;
  - xlix. Tariq Banuri, Muhammad Arif Goheer, Muhammad Zia-ur-Rahman Hashmi and Shahbaz Mehmood, Workshop on University Consortium organized jointly by GCISC and Higher Education Commission on 08 August 2017, Islamabad;



- I. All GCISC Technical Staff, Collaborative meeting with the Delegation from University of Utah-USA, 7 August 2017, Islamabad.
- ii. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, UNESCO Sponsored International Conference on “Water Processing for Sustainable Development”, NUST, Islamabad, 1 - 2 August 2017;
- iii. Muhammad Arif Goheer, Meeting with FAO mission to Pakistan for the transformation to climate smart Agriculture: increasing farmer resilience to drought and reducing carbon emissions in climate-vulnerable areas of Pakistan at GCISC- 25 Jul 2017;
- iiii. Muhammad Ijaz & Kaleem Anwar Mir-National Workshop on greenhouse gas inventories organized by GCISC and CfRN at Serena- 18 Jul 2017;
- liv. Muhammad Zia-ur-Rahman Hashmi and Amjad Masood, UNESCO Sponsored Advanced Training Course on "Remote Sensing and GIS Applications in Flood Management", 18 - 31 July 2017, NUST, Islamabad.

## **12. Contributions to Research Projects:**

- i). “Remote sensing for Spatio-temporal mapping of smog in Punjab and identification of the underlying causes using GIS techniques (R-SMOG)”. A Joint study with Food and Agriculture Organization, (FAO), Pakistan;
- ii). Pak-SNC (2018). “Pakistan’s Second National Communication (Pak-SNC) on climate change project” under United Nations Framework Convention on Climate Change (UNFCCC) by Ministry of Climate Change (MoCC), Government of Pakistan;
- iii). Climate smart agriculture through sustainable water use management: Exploring new approaches and devising strategies for climate change adaptation in South Asia funded by Asia Pacific Network for Global Change Research, Japan;
- iv). Development of of Food Security and Nutrition Information System (FSNIS)/ Food Security Monitoring System, A joint study with Food and Agriculture Organization, (FAO), Pakistan;
- v). Project on the Preparation of Background papers for GCF project proposal ‘Transforming of the Indus Basin with the Introduction of Climate Resilient Agriculture and Sustainable Water Management’ awarded to GCISC by Food and Agriculture Organization (FAO), Pakistan;
- vi). GLOF and Climate Change Risk and Vulnerability Assessment Study for FWO Hydropower Projects in Chitral;
- vii). Consultancy Services provided by one scientist for Asia Development Bank (ADB) project titled “Climate Risk and Vulnerability Assessment (CRVA) in Bajaur, Khyber, and Mohmand Agencies of Pakistan 2018”;
- viii). “Impact of debris cover thickness and temperature variations on glacier melting (in relation to Karakoram Anomaly) in the Upper Indus Basin” with

Chinese Academy of Sciences and International Centre for Integrated Mountain Development (ICIMOD);

- ix). Strengthening of GHG inventory for Agriculture, Forestry and Land Use (AFOLU) Sector under Coalition for Rainforest Nations (CfRN) technical support under reporting for Results Based REDD+;
- x). APN Project on Improving Skills for Promoting Sustainable Watershed Management Practices in South Asia.

### **13. Mass Awareness / Media Appearance:**

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

### **14. Key Achievements / Contributions to International Efforts:**

- Key Contribution to Pakistan's Second National Communication (SNC);
- Preparation of National Greenhouse Gas Inventory report (2014-15);
- Observer status of GCISC by the Intergovernmental Panel on Climate Change (IPCC). GCISC is the 1<sup>st</sup> organization in Pakistan to get this status;
- GCISC became IUCN member in January 2018;
- Two GCISC scientists contributed as Lead Authors in IPCC to 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
- Two GCISC scientists contributing as lead Authors to contribute to IPCC 6<sup>th</sup> Assessment Report on climate change;
- GCISC was represented in UNFCCC Conferenc of Parties (COP-23) in November 2017;
- GCISC and Collaborating institutes like (PARC, PCRWR, PMD, NIH, FFC, NUST, HEC, UET-Peshawar, UAF, PSF) agreed to form an Advisory Group for Research and Capacity Building on Climate Change, for which GCISC serves as the secretariat. The Advisory Group agreed to launch five collaborative projects related to (a) future scenarios in Pakistan for different degrees of global warming (i.e., 1.5 degrees, 2 degrees, 3 degrees, etc.);

- (b) Action on Pakistan's INDC's consistent with national goals and objectives (this will include energy targets as well as those in agriculture and land use); (c) disaster management under the impact of climate change; (d) climate finance; and (e) from climate policy to implementation;
- Prime Minister of Pakistan approved a plan to enhance the capacity of the Center, through training, technical assistance, collaborative research, partnership development, and enhanced communication and dissemination of research outputs. The implementation of the Prime Minister's directive includes the approval of plans to restructure the institution, signing of partnership agreements with key national entities, developing collaborative agreements with leading universities, recruitment of international experts as research advisors, recruitment of additional personnel, engaging the involvement of the Pakistani diaspora, and the organization of Pakistan's largest-ever scientific conference on climate change. These actions are designed to improve the quality of research and policy advice available to the government;
- Approval by the BoG to restructure the Centre along the well-known IPCC classifications namely (a) Climate Science, Climate modelling and Climatology (which will be based on the current climatology section); (b) Climate impacts and adaptation (which will bring together the current sections of agriculture and water); and (c) Climate mitigation, climate financing, and climate economics;
- One scientist received Excellence Award in UNFCCC-GIR-CASTT Programme on GHGs based on outstanding performance in the 2018 UNFCCC-GIR-CASTT Programme on Greenhouse Gases, held in Republic of Korea.

## **15. Organization of Seminars:**

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

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

- v. Experiences from "Energy Transition Visiting Program (23-27 April 2018)" organized by HBS Germany, Muhammad Amjad, Senior Scientific Officer, GCISC- 04 May 2018;
- vi. Global Change and Response for Sustainable Water Resources Management, Dr. Hassan Abbas, Chairman ZiZAK (Pvt) Ltd- 27 April 2018
- vii. Impact of the 21st Century Climate Change on Surface Water Availability of the Transboundary Kabul River Basin, Dr. Zia Hashmi, Head Water Resources & Glaciology, GCISC- 20 April 2018;
- viii. Mapping Air Pollution Using Geospatial Technologies, Sahibzada Saadoon Hammad, Research Assistant, GCISC- 13 April 2018;
- ix. Sustainable Land Management Programme to Combat Desertification in Pakistan, Abdul Hamid Marwat, National Program Coordinator, Sustainable Land Management Program- 6 April 2018;
- x. 'Application of Sediment Transport and Reservoir Operation Modeling for Sustainable Water Resources Management' (Post Visit Seminar about USAID Training course held at Hydrologic Engineering Center, USA), Aftab Ahmad Khan and Muhammad Arif Goheer, GCISC- 30 March 2018;
- xi. Hydro-Economic evaluation of Surface water reservoirs on Indus River System, Haris Mushtaq, Research Assistant, LEAD Pakistan- 16 March 2018;
- xii. Climate change risk perceptions, impacts and adaptation: A farmer's perspective from Punjab, Pakistan, Dr. Muhammad Abid, CCRD, COMSATS IIT, Islamabad- 9 March 2018;
- xiii. 'Tailored WRF Regional Climate Modeling for Hydrologic Impact Applications over Pakistan' - Post Visit Seminar about USAID Training held at National Center for Atmospheric Research (NCAR), Boulder-Colorado, USA, Shahbaz Mehmood and Muhammad Amjad, GCISC- 2 March 2018;
- xiv. A Statistical Downscaling Model for Summer Rainfall over Pakistan, Dr. Dildar Kazmi, Meteorologist at National Agromet Centre, Pakistan Meteorological Department- 23 February 2018;
- xv. Karakoram cryosphere: Glacial lakes and associated threats, Dr. Muhammad Ashraf, Expert in Glacier studies, Ex-GMRC-WAPDA- 15 February 2018;
- xvi. Scenario generation at farm level using R codes for AgMIP Pakistan, Burhan Ahmad, Meteorologist, PMD- 9 February 2018;
- xvii. Exploring Water-Energy-Food Nexus in Pakistan through a System Dynamic Modelling Approach, Danyal Aziz, GCISC Researcher- 2 February 2018;

- xviii. Karakoram cryosphere: Glacial lakes and associated threats, Dr. Muhammad Ashraf, Expert in Glacier studies, Ex-GMRC-WAPDA- 26 January 2018;
- xix. Soot emissions as a significant contributor to global warming, Nasreen Farah, Chief Scientific Officer, HDIP- 12 January 2018;
- xx. Planning and Assessment of Water Resource Projects in an uncertain climate future: Application of hydro-economic simulation Framework, Saba Batool, MS student at PIDE Islamabad- 5 January 2018;
- xxi. Present and future climate projections of South Asian surface precipitation using dynamical downscaling method, Mehwish Ramzan- 29 December 2017;
- xxii. Genetics of water deficit tolerance in wheat (*Triticum aestivum* L.), Dr. Kashif Rashid, Ph.D. PBG; University of Agriculture Faisalabad- 8 December 2017;
- xxiii. Hydrological Projections and Reservoir Management, Statistical Downscaling of the Process-based Climate Models for the Upper Indus Basin, Dr. Firdos Khan- 24 November 2017;
- xxiv. Spatial Flood Risk Analysis of Chenab River from Marala to Qadirabad based on MCDA Approach, Engr. Sher Shah, BS Student, Agricultural Engineering Department, University of Engineering & Technology (UET), Peshawar- 17 November 2017;
- xxv. Precipitation distribution and synoptic patterns in Austria under climate change conditions, Asma Yaqub, Research Scientist at the Institute of Meteorology, University of Natural Resources and Life Sciences, Vienna, Austria- 10 November 2017;
- xxvi. Climate Change Scenario: From Climate Model Ensemble to Local Indicators, Dr. Imran Nadeem, Institute of Meteorology (BOKU-MET), Austria- 3 November 2017;
- xxvii. Special Presentation Session - Development of an Energy Sector Modelling Emission Forecasting Tool for Pakistan, Kaleem Anwar Mir, Scientific Officer, GCISC- 2 November 2017;
- xxviii. Community-Government Partnership for Metered Clean Drinking Water: A Case Study of Bhalwal Pakistan, Muhammad Naveed Iftikhar, Ph.D. Candidate at the University of Delaware, USA- 27 October 2017;
- xxix. Progress of recent research visits to China and Japan (related to Climate modelling) and future research directions, Dr. Shaukat Ali, Senior Scientific Officer, GCISC- 20 October 2017;
- xxx. Overview of Climate Change Studies at CAEWRI-NARC/PARC, Dr. Bashir Ahmad, Principal Scientific Officer, Climate Change Alternate Energy and Water Resources Institute (CAEWRI), NARC/PARC- 13 October 2017;

- xxxvi. Key Highlights of recently held "2nd Lead Authors' Meeting for the Elaboration of the 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventory Preparation" in Victoria Falls, Zimbabwe, Muhammad Arif Goheer and Muhammad Ijaz, GCISC- 6 October 2017;
- xxxvii. Soil Erosion Modelling to Estimate Land Degradation Risks at National Level, Mudassar Maqsood, Associate Programme Coordinator, River Basin Management at ICIMOD- 29 September 2017;
- xxxviii. Forest Land Use Change Assessment for REDD+ Monitoring, Reporting and Verification System in Pakistan, Iqra Atif, PhD student (near completion) at IGIS-NUST- 22 September 2017;
- xxxix. Assessing climate change impacts on water demands: Clout of baseline scenario and key climate variables, Dr. Zaigham Habib, A Freelancer Researcher- 15 September 2017;
- xl. Women and Climate Change in Pakistan, Khawar Mumtaz, Chairperson of the National Commission on the Status of Women (NCSW)- 8 September 2017;
- xli. Flood Risk Management in a Changing Climate, Dr. Imran Saqib Khalid, Research Fellow, Sustainable Development Policy Institute, Islamabad- 25 August 2017;
- xlii. Climate Change and Water Cycle Variability - Application of Hydrological and Hydraulic Modeling, Dr. Shakil Ahmad, Assistant Professor, NUST Inst. of Civil Engineering- 18 August 2017;
- xliiii. Food Security under Changing Climate Concerns, Dr. Mohsin Iqbal, IPCC Lead Author and former GCISC Section Head- 11 August 2017;
- xliv. Assessment of Effects of Climatic Conditions on Ambient Air Quality, Dr. Anjum Rasheed, CCRD COMSATS IIT- 4 August 2017;
- xlv. Community perception about changing climate and local adaptation in Gilgit River watershed, Zia Hashmi and Amjad Masood, GCISC- 28 July 2017;
- xlvi. Who Will Think Outside the Sink? Farmers' Willingness to Invest in Technologies for Groundwater Sustainability in Pakistan, Junaid Alam Memon, Ph.D. (Assistant Professor at Pakistan Institute of Development Economics, Islamabad)- 21 July 2017;
- xlvii. Policy Perspective of Energy-Water Nexus for Rural Areas - Case Study of Multan, Punjab, Dr. Sardar Mohazzam, (UNDP Lead Consultant)- 14 July 2017;
- xlviii. "Hydro-climatic Studies Biases in the Hindukush-Karakoram-Himalayan Basins", Dr. Asif Khan, Assistant Professor, KPK UET Peshawar- 5 July 2017;

- xliv. Estimating Glacier Melt Rates in the Himalayas, Jewell Lund, Graduate Student, University of Utah- 4 July 2017;
- xliv. Role of urban Environmental Gradients in Dengue transmission in Pakistan, Dr. Bushra Khalid, Post Doc, IIASA- 3 July 2017.

**16. Other Important Assignments:**

***General Administrative/ Technical Functioning:***

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