

KPCSD EVENTS**ENERGISING AGRICULTURE AND ENABLING
JUST ENERGY TRANSITIONS IN SOUTH ASIA:
A REGIONAL KNOWLEDGE FORUM**

Dr Kiran C Patel Centre for Sustainable Development (KPCSD) organised a Regional Knowledge Forum titled “Energising Agriculture and Enabling Just Energy Transitions in South Asia” from February 6 to 8, 2023, in partnership with the International Water Management Institute (IWMI) and other organisations,

including World Resources Institute (WRI) India, Global Green Growth Institute (GGGI), International Renewable Energy Agency (IRENA), Ahmedabad University, International Solar Alliance (ISA) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Nearly 170 participants from 16 countries attended the regional forum. Representatives from industry, government, and academia discussed sustainable management of water, renewable energy, agriculture, and solar irrigation.

CLIMATE ACTION NOW 2022-23

KPCSD extended its support in organising the mega workshop series Climate Action Now at IIT Gandhinagar in collaboration with the Gujarat Ecological Education and Research (GEER) Foundation. Segment I of the workshop series with the theme Climate Policy and Governance was organised in February 2020. Segment II, held from January 16-20, 2023, with the theme Climate Action and the Role of Industries featured discussions on cleaner production technologies, green industries, Environmental and Social Governance (ESG), and industrial waste management. Segment III, held from January 27-31, 2023, themed Climate Change Centric Research and Development focussed on solar and geothermal energy, climate resilient agriculture, climate change driven disasters, climate change impact, and vulnerable communities. Nearly 200 participants attended the Segment II and III workshops.

KPCSD SPECIAL SEMINARS

KPCSD organised a Special Seminar on “The Path to Zero: Protecting People and the Planet through Investment and Innovation” by **Mr Mahesh Ramanujam**, Co-Founder, President, and CEO of the Global Network for Zero.

KPCSD hosted another special seminar, jointly with the Humanities and Social Sciences discipline on “Energy Security Face to Climate Change: Between Autocentrism Deadlock and Global Fairness” by **Prof Edgard Gnansounou**, Former Head of the Bioénergie and Energy Planning Research Group at École Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology Lausanne) Switzerland and a Scholar-in-Residence at Electrical Engineering, IIT Gandhinagar.



SUSTAINABILITY SEMINAR SERIES

The Centre conducted four seminars between January through June 2023 as part of the Sustainability Seminar Series. The seminars covered various topics, including carbon-neutral energy, water, climate, environmental management and air quality management. Nearly 400 people attended the events from India and several locations across the globe, such as Argentina, Austria, Bangladesh, Germany, Sweden, the United Arab Emirates, the United Kingdom and the United States. Details of the seminars organised are as follows:

Prof Rajendra K Bordia, the George J. Bishop, III Professor of Materials Science and Engineering at Clemson University and Guest Professor, Materials Engineering and KPCSD; Critical and enabling role of materials in carbon neutral energy

Prof Upmanu Lall, the Founding Director of the Columbia Water Center, the Alan and Carol Silberstein Professor of Engineering, and a Senior Research Scientist at the International Research Institute for Climate & Society at Columbia University; The co-evolution of humans, climate, water, earth and biota: The next chapter?

Prof Brajesh K Dubey, Professor, Circular Engineering, Department of Civil Engineering, and Chair, School of Water Resources at the Indian Institute of Technology Kharagpur; Circular engineering approaches for environmental management

Ms Swagata Dey, Project Manager - Air Quality, Environmental Defense Fund; Role of technology and instrumentation in air quality management in India

EARTH DAY 2023 (EARTHCON'23)

The Earth Sciences discipline at IITGN conducted its flagship event, EarthCon'23, to observe Earth Day 2023. The event was funded by the Gujarat Pollution Control Board (GPCB). KPCSD extended its support in organising the event. Nearly 75 students from three schools participated in the half-day-long event, which consisted of a range of activities, including bird watching, tree plantation, seminars, poster presentations, and stall exhibitions. The seminar speakers included Dr Narottam Sahoo, Advisor, Gujarat Council on Science and Technology (GUJCOST); Dr Sandeep Pandey, Associate Professor cum Senior Program Manager, Gujarat Institute of Disaster Management (GIDM); Dr Chhavi Nath Pandey, ex-IFS and Professor of Practice, IIT Gandhinagar and Mr Devang Thaker, Member Secretary, GPCB.

Q&A



with Prof Sudhir Kumar Arora

Professor of Practice
Civil Engineering

What is India's current wastewater management status, its impact on development and the environment, and associated challenges?

I see three major key impact missions of the government in this field. The first one is, mandatory reuse of treated wastewater for non-potable industrial applications. Apart from fresh water savings, it prepared society to accept wastewater as a resource. The other two game-changer mega missions are 'Swachh Bharat Abhiyan' and 'Har Ghar Jal'. These missions are having substantial positive impacts in terms of health and quality of life in entire rural India.

Two key challenges which require focus for technical innovations are (a) reuse of wastewater for potable applications, including drinking, and (b) efficient wastewater management in rural and peri-urban areas. To convert these challenges into business opportunities, we must gear up our students' technical skills, particularly regarding innovative low-cost solutions in membrane-based treatments and accident-free gravity flow-based sewerage systems.

How can young engineers foster innovation and entrepreneurship in wastewater management?

Membrane-based purification up to drinking water standards has many stages. Improvement at every stage of treatment reduces the load on the membrane and hence enhances its life. Indigenous low-cost manufacturing of membranes should be the final goal. Its demand will only increase geometrically in future. The second important issue is efficient gravity networks in villages and peri-urban areas. The network of sewers in the catchment of STP costs up to 50% of the total project cost. Due to water shortage, organic matter settles in sewers and undergoes anaerobic decomposition. It causes a release of toxic gases and becomes hazardous for workers. This field requires innovations from various engineering streams, including IT and the drone industry, working together as one expert group.

What are some unique features of the pilot project on sewage management for rural and peri-urban areas, recently implemented as a pilot at IIT Gandhinagar?

The pilot project utilised a new concept of a 'Ring Sewer System' - gravity sewer laid in a ring pattern - the trunk sewer originates from the bioreactor of STP, collects wastewater from the catchment, partly treats it en-route, and discharges it back at the reactor for further treatment.

The project undertakes a holistic approach, including innovations such as the use of modified traditional and locally available water-wheel (generally used in villages for lifting water for irrigation) for aeration, ensuring minimum human intervention for sewer cleaning, and use of media balls (which can be made using recycled plastic) to support the growth of biomass in the reactor as well as in ring sewer. This ensures sewers are more useful and safe.

The pilot system demonstrated increased dissolved oxygen and significant reduction in bio oxygen demand and nitrogen. The project results indicate a good potential for further work on the ground.

In wastewater treatment, how can we ensure the long-term maintenance and sustainability of treatment facilities?

The traditional wastewater treatment methods need upgradation and replacements to cope with the current challenges of reuse and resource recovery rather than only safe discharge. I think, ultimately society will go for direct potable reuse of water. As a premier educational institute, we need to motivate and educate our students to channelise their vibrant youth in this field, which has excellent professional opportunities.

Prof Sudhir Kumar Arora is Professor of Practice in the Civil Engineering department at IIT Gandhinagar. Prof Arora is a retired IDSE officer from Engineering Services batch 1983, served as Chief Engineer (HAG) with Military Engineer Services at Lucknow. He has vast expertise of about 40 years in wastewater management, infrastructure development, water supply, low cost sanitation and associated domains of working with the Government of India in various positions of Army, Navy, and Air Force as a part of his association with the Ministry of Defence.

TIMES HIGHER EDUCATION IMPACT RANKINGS 2023

The Times Higher Education Impact Rankings assess universities worldwide against the United Nations Sustainable Development Goals (SDGs). It uses carefully calibrated indicators to provide comprehensive and balanced comparison across four broad areas: research, stewardship, outreach and teaching. The Institute featured in the Top 60 for SDG 12 (responsible consumption and production), Top 200 for SDG 6 (clean water and sanitation) and Top 300 for SDG 7 (affordable and clean energy) out of nearly 1600 institutes globally.

RESEARCH

Nine sponsored research, consultancy and internally funded projects relating to sustainable development were initiated by the affiliate faculty members during January to June 2023.

- Developing renewable energy roadmap 2030 for Gujarat, Gujarat Energy Development Agency; PI: Vimal Mishra
- Development of novel adsorbent and prototyping of powerless water filter, National Mission on Himalayan Studies (NMHS); PI: Biswajit Saha
- Field guide for birds at IITGN and bird coffee table, IIT Gandhinagar; PI: Ambika Aiyadurai
- Fine-grained air quality exposure modelling and forecasting using machine learning, Ministry of Earth

- Sciences; PI: Nipun Batra
- Geothermal reservoirs and their potential in India, Paired Early Career Research Fellowship in Applied Research; PI: Pankaj Khanna
- Improving short-to-medium range extreme precipitation forecasts with Climate Networks and hybrid physics-ML convection parameterization, Monsoon Mission-III, Ministry of Earth Sciences and Indian Institute of Tropical Meteorology; PI: Udit Bhatia

- Training program on 'Regulatory framework in power sector', Gujarat Energy Training and Research Institute (GETRI); PI: Naran M Pindoriya
- Urban heat island mitigation using blue and green infrastructure, IIT Gandhinagar; PI: Sushobhan Sen
- Vadnagar glass and its role in maritime network, Gujarat State Archaeology Department (GSA); PI: Alok Kumar Kanungo

IITGN faculty published nearly 50 journal papers, books/ book chapters, conference papers, or newspaper/ magazine articles in various sustainability areas during January to June 2023:

Water

- Patel, Panchami; Gangwar, Pratibha and Thareja, Prachi, "Preparation and rheology of titanium dioxide nanoparticles loaded κ-carrageenan hydrogel beads strengthened by mixed salts for multipollutant water remediation", *Journal of Vinyl and Additive Technology*, DOI: 10.1002/vnl.21980, Jan. 2023.
- Sahu, Prateeksha Suman; Verma, Ravi Prakash; Dhabade, Ajinkya Hariram; Tewari, Chetna; Sahoo, Nanda Gopal; Saha, Biswajit, "A novel, efficient and economical alternative for the removal of toxic organic, inorganic and pathogenic water pollutants using GO-modified PU granular composite", *Environmental Pollution*, DOI: <https://doi.org/10.1016/j.envpol.2023.121201>, Feb. 2023.
- Dangar, Swarup and Mishra, Vimal, "Excessive pumping limits the benefits of a strengthening summer monsoon for groundwater recovery in India", *One Earth*, 419-427, DOI: 10.1016/j.oneear.2023.03.005, Apr. 2023.
- Bhasme, Pravin and Bhatia, Udit, "Synergizing machine learning with conceptual model for daily reservoir storage predictions in the data-scarce catchments", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Joshi, Mrugesh and Swaminathan, Jaichander, "Reverse osmosis membrane and module improvement roadmap for maximum impact", *Desalination*, vol. 554, DOI: 10.1016/j.desal.2023.116511, May 2023.
- Juybari, Hamid Fattahi; Karimi, Mohammad; Srivastava, Rishabh; Swaminathan, Jaichander and Warsinger, David M., "Superhydrophobic composite asymmetric electrospun membrane for sustainable vacuum assisted air gap membrane distillation", *Desalination*, vol. 553, DOI: 10.1016/j.desal.2023.116411, May 2023.
- Ali, Afsar, Meena, Badri Vishal, Shah, Naseer Ahmed, Kaushik, Tannu, Dolkar, Thinles, Ghoroi, Chinmay, Dutta, Arnab, "Deploying a molecular copper catalyst for efficient degradation of commercial and industrial dyes under practical conditions", *Environmental Science: Water Research & Technology*, DOI: <https://doi.org/10.1039/D3EW00185G>, Jun. 2023.
- Srivastava, Rishabh; Jaiswal, Ankush Kumar; Jayakumar, Arjun and Swaminathan, Jaichander, "Internal feed preheating necessary for energy-efficient modular multi-effect membrane distillation", *Desalination*, vol. 564, DOI: 10.1016/j.desal.2023.116753, Jun. 2023.

Pollution and Waste Management

- Desai, Aadesh; Gujarathi, Eshan; Parikh, Saagar; Yadav, Sachin; Patel, Zeel B. and Batra, Nipun, "Deep gaussian processes for air quality inference", in the *6th Joint International Conference on Data Science & Management of Data (10th ACM IKDD CODS and 28th COMAD)*, Bombay, IN, Jan. 4-7, 2023.
- De, Shruti; Selvaraj, Ramya; Grattan, Kenneth T. V. and Chakraborty, Arup Lal, "Detailed analysis of the R1f/ΔI1 WMS technique and demonstration of significantly higher detection sensitivity compared to 2f WMS for calibration-free trace gas sensing", *Applied Optics*, vol. 62, no. 12, pp. 3160-3168, DOI: 10.1364/AO.484976, Apr. 2023.

- Goyal, Shekhar and Bhatia, Udit, "Trade-driven relocation of greenhouse gas emission in India", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Singh, Simranjit; Takhar, Vishakha; Nannuri, Shivanand H.; George, Sajjan D.; Banerjee, Rupak and Misra, Superb K., "Synergistic effect of Yb3+, Tm3+, Nd3+ doped NaYF4 nanoparticles and MoS2 nanosheets for enhanced photocatalytic dye degradation under visible light", *ACS Applied Nano Materials*, vol. 6, DOI: 10.1021/acsami.3c01392, Jun. 2023.

Climate Change

- Chuphal, Dipesh Singh and Mishra, Vimal, "Increased hydropower but with an elevated risk of reservoir operations in India under the warming climate", *iScience*, DOI: 10.1016/j.isci.2023.105986, Jan. 2023.
- Upadhyay, Divya; Dixit, Sudhanshu and Bhatia, Udit, "Quantifying the role of internal climate variability and its translation from climate variables to hydropower production at basin scale in India", *Journal of Hydrometeorology*, 24, no. 3, 407-423, DOI: 10.1175/JHM-D-22-0065.1, Mar. 2023.
- J. S., Nanditha; Kushwaha, Anuj Prakash; Singh, Rajesh; Malik, Iqura; Solanki, Hiren; Chuphal, Dipesh Singh; Dangar, Swarup; Mahto, Shanti Shwarup; Vegad, Urmin and Mishra, Vimal, "The Pakistan flood of August 2022: causes and implications", *Earth's Future*, vol. 11, no. 3, DOI: 10.1029/2022EF003230, Mar. 2023.
- Bind, Vivek Kumar and Jain, Vikrant, "Bed level variation and channel sensitivity analysis of a river channel to the extreme flood event", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Menon, Shraddha and Khanna, Pankaj, "Carbonate sediment production, redistribution and accumulation in ongoing climate warming – the case of Lakshadweep Archipelago", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Sobhana, Nanditha J. and Mishra, Vimal, "Drivers of widespread flooding in Indian river basins", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Mahto, Shanti Shwarup and Mishra, Vimal, "Flash drought intensification due to enhanced land-atmospheric coupling in India", *Journal of Climate*, DOI: 10.1175/JCLI-D-22-0477.1, Apr. 2023.
- Mahto, Shanti Shwarup and Mishra, Vimal, "Increasing risk of simultaneous occurrence of flash drought in major global croplands", *Environmental Research Letters*, vol. 18, DOI: 10.1088/1748-9326/acc8ed, Apr. 2023.
- Dave, Raviraj and Bhatia, Udit, "Investigating the impact of extreme precipitation induced urban flooding on road network disruption", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Malik, Iqura and Mishra, Vimal, "Unfolding the role of active/break spells in compound hot and dry extremes (CHDE) in India", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
- Rajeev, Akshay and Mishra, Vimal, "Increasing risk of compound wind and precipitation extremes due to tropical cyclones in India", *Environmental Research: Climate*, vol. 2, DOI: 10.1088/2752-5295/acccf2e, May 2023.

- Christian, Jordan I.; Martin, Elinor R.; Basara, Jeffrey B.; Furtado, Jason C.; Otkin, Jason A.; Lowman, Lauren E. L.; Hunt, Eric D.; Mishra, Vimal and Xiao, Xiangming, "Global projections of flash drought show increased risk in a warming climate", *Nature Reviews Earth & Environment*, vol. 4, no. 1, DOI: 10.1038/s43247-023-00826-1, Jun. 2023.
- Mishra, Vimal et. al., "Irrigation in the earth system", *Nature Reviews Earth & Environment*, DOI: 10.1038/s43017-023-00438-5, Jun. 2023.

Energy

- Suthar, Sachinkumar; Cherukuri, S. Hari Charan and Pindoriya, Naran M., "Peer-to-peer energy trading in smart grid: frameworks, implementation methodologies, and demonstration projects", *Electric Power Systems Research*, vol. 214, DOI: 10.1016/j.epr.2022.108907, Jan. 2023.
- Saini, Tak Radhe Shyam; Pappas, Iosif; Avraamidou, Styliani and Ganesh, Hari S., "Noncooperative distributed model predictive control: a multiparametric programming approach", *Industrial & Engineering Chemistry Research*, DOI: 10.1021/acs.iecr.2c03057, Jan. 2023.
- Dhakar, Shikha; Nama, Jatin; Kumari, Varsha; Khatua, Rudranarayan; Mondal, Anirban and Sharma, Sudhanshu, "Ethanol formation via CO2 electroreduction at low overvoltage over exposed (111) plane of CuO thin film", *Electrochimica Acta*, DOI: 10.1016/j.electacta.2022.141791, Feb. 2023.
- Khatua, Rudranarayan; Das, Bibhas and Mondal, Anirban, "Rational design of non-fullerene acceptors via side-chain and terminal group engineering: a computational study", *Physical Chemistry Chemical Physics*, DOI: 10.1039/D2CP05958D, Feb. 2023.
- Singh, Manoj; Nama, Jatin; Paul, Tufan; Makani, Nisha Hiralal; Sahoo, Aditi; Sharma, Sudhanshu and Banerjee, Rupak, "Photoelectrochemically induced CO2 reduction using halide-tunable lead-free perovskites", *ACS Applied Energy Materials*, DOI: 10.1021/acsaem.3c00053, Mar. 2023.
- Ratnaparkhi, Aniket; Dave, Drashti; Valerino, Michael; Bergin, Mike and Ghoroi, Chinmay, "Quantifying the accuracy of optical transmission loss techniques and identifying the best wavelengths for estimating soiling in a field study", *Solar Energy*, vol. 252, pp. 391-400, DOI: 10.1016/j.solener.2023.02.005, Mar. 2023.
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- Patel, Chirag G. and Swaminathan, Jaichander, "Energy savings by implementing a serpentine flow path in electroanalysis", *Science Talks*, DOI: 10.1016/j.stalk.2023.100244, May 2023.
- Mittireddi, Ravi Teja; Makani, Nisha Hiralal; Prajapati, Deepak; Gautam, Abhay Raj Singh; Banerjee, Rupak and Panda, Emilia, "Microstructure-induced functionality in titanium dioxide thin films", *Materials Characterization*, vol. 199, DOI: 10.1016/j.matchar.2023.112818, May 2023.

- Kumar, Ravinder; Haridasan, Mahesh M.; Ahmad, Inzamam and Bhargav, Atul, "Experimental investigations on a non-catalytic diesel autothermal reformer with reacting and non-reacting pre-mixer", *International Journal of Hydrogen Energy*, DOI: 10.1016/j.ijhydene.2023.06.125, Jun. 2023.
- Prasad, Vighnesh; Thareja, Prachi and Mehrotra, Surya Pratap, "Influence of rheology on the flow characteristics of bauxite slurries during hydraulic conveying through the pipeline", *Transactions of the Indian Institute of Metals*, DOI: 10.1007/s12666-023-02988-0, Jun. 2023.
- Singh, Manoj; Paul, Tufan; Makani, Nisha Hiralal; Dewanshi and Banerjee, Rupak, "Role of antisolvent-based two-step fabrication process in retention of structural stability of organic-inorganic perovskites", *Journal of Materials Science: Materials in Electronics*, vol. 34, DOI: 10.1007/s10854-023-10856-2, Jun. 2023.
- Bagchi, Sushmit and Tailor, Falguni, "Linking 5-R approach to sustainable development goals: a conceptual framework for green marketing in cottage industries in India", in the *2nd International Conference on Management of MSMEs (ICMM 2023)*, Amritsar, IN, Jan. 20-22, 2023.
- Tailor, Falguni and Xaxa, Aashish, "Urban forests in India: exploring possibilities within the SDG framework and assessing its role in sustainable regenerative place-making", in the *International Conference on Sustainable Urbanism in the Global South*, Bhubaneswar, IN, Feb. 10-11, 2023.
- Aiyadurai, Ambika; Chattopadhyay, Arka and Choksi, Nishaant (Eds.), *Ecological entanglements: affect, embodiment and ethics of care*, Hyderabad: Orient BlackSwan, Mar. 2023, ISBN: 9789354422591.
- Delley, Razzeko and Aiyadurai, Ambika, "Eno: eco-spiritual water climes of Dibang valley, Arunachal Pradesh", in *Storying multipolar climes of the Himalaya, Andes and Arctic: anthropogenic climate and shapeshifting watery lifeworlds*, London: Routledge, DOI: 10.4324/9781003347026-7, Mar. 2023, ISBN: 9781003347026.
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- Aiyadurai, Ambika, "On the periphery: bone ornaments of the Idu Mishmi", *Ornamentmagazine*, Mar. 2023.
- Raj, Anukritika; Jain, Vikrant; Bind, Vivek Kumar; Padhya, Virendra and Deshpande, Rajendrakumar Dattatraya, "The GW-SW dynamics of a perennial dryland river in the semi-arid region, India", in the *EGU General Assembly 2023*, Vienna, AT, Apr. 23-28, 2023.
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- Aiyadurai, Ambika, "Indigenous wildlife hunting and trapping practices of the Mishmi (Kaman), Arunachal Pradesh", in the *Oxford Handbook of Global Indigenous Archaeologies*, United Kingdom: Oxford University Press, pp. C52S1-C52N1, DOI: 10.1093/oxfordhb/9780197607695.013.52, Jun. 2023, ISBN: 9780197607695.

Natural Resources, Wildlife and Ecosystems

• Bagchi, Sushmit and Tailor, Falguni, "Linking 5-R approach to sustainable development goals: a conceptual framework for green marketing in cottage industries in India", in the *2nd International Conference on Management of MSMEs (ICMM 2023)*, Amritsar, IN, Jan. 20-22, 2023.

EDUCATION

The following short courses and training programmes were conducted by the KPCSD affiliate faculty:

- Powder processing of materials by Prof Rajendra K Bordia from 16-23 January, 2023
- Geotechnical investigations for structural engineering by Prof Jimmy Thomas from 18-21 January, 2023
- Apna Jal 'अपना जल' – Reuse of treated wastewater by Prof Sudhir K Arora from 13-24 February, 2023
- Coral reefs: Past, present and future by Prof Pankaj Khanna from 6-10 March, 2023
- Management of sewage (Transport, Treatment, Reuse) for Military Engineer Services officers by Prof Sudhir K Arora from 20-22 March, 2023

Invited talks and lectures by the KPCSD affiliate faculty include:

- Dielectric, piezoelectric, and energy harvesting properties in 2D layered halide perovskites by Prof Rupak Banerjee at the International Conference on Advanced Materials (ICAM 2023), Goa University, 20-25 February, 2023
- Mechanism of ionic conductivity, dielectric relaxation, and energy harvesting properties of halide perovskites by Prof Rupak Banerjee at the Perovskite Society of India Meet-2023, IIT Roorkee, 1-3 March, 2023
- Transformation of tribal hinterlands into urban spaces in India's Fifth and Sixth Schedule Areas: Emerging issues and contestations at the Development Studies Lecture Series, by Prof Aashish Xaxa, Humanities and Social Sciences Department, IIT Guwahati, 14 March, 2023
- Understanding linkages between water and caste in India by Prof Ambika Aiyadurai at IIM Bangalore, 20 March, 2023
- Energy transition and mitigation/ adaptation solutions and nature based solutions, social behavioural solutions, and technological solutions by Prof Vimal Mishra at the Workshop on 'Can computing technology help India accomplish its

sustainability goals in the coming decade?', Science for Scale, IBM Research India 25, Bengaluru, 13 April, 2023

- The impacts of heat on rural vs urban geographies: Urban heat island impacts and vulnerabilities for India's agriculture and labour by Prof Vimal Mishra at the National workshop on heatwaves, climate change and its impacts on health, economy and energy policies of India, Climate Trends and Global Strategic Communications Council, Bengaluru, 27-28 April, 2023
- Wildlife conservation policy in India by Prof C N Pandey at the International conference on wildlife conservation: Emerging scenario and way forward, Kanha Tiger Reserve, Madhya Pradesh, 27-29 April, 2023
- Current status and future directions of hydrology in India under climate change in Hydrology and Cryosphere session by Prof Vimal Mishra at the International climate research conclave 2023, IIT Bombay, 26-27 May, 2023
- Ecocentrism as a concurrent theme: The role of nature in tribal life and literature by Prof Aashish Xaxa at the Centre for Asia-Pacific Initiatives, University of Victoria, Canada and Tell Me Your Story, 31 May, 2023
- Thermodynamic reasoning in earth system science by Prof R N Singh at CSIR-NGRI, Hyderabad, 14 June, 2023
- Exergy in sustainability by Prof R N Singh at CSIR-NEERI Hyderabad Zonal Centre, Hyderabad, 16 June, 2023
- Multi-objective model predictive control through multiparametric programming by Prof Hari Ganesh at the Symposium on emerging technologies and future trends in chemical engineering (75th anniversary celebration of the IISc Chemical Engineering Department), IISc Bangalore, 24 June, 2023
- Dismantling Colonial Cartography: Indigenous Urbanism as Spatiality, India at the 'Crisis in the Anthropocene: Rethinking Connection and Agency for Development' Conference by Prof Aashish Xaxa, University of Reading, Berkshire, organised by the Development Studies Association, UK, 28-30 June 2023