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DIVECHA CENTRE FOR CLIMATE CHANGE

Newsletter of the

DIVECHA CENTRE FOR CLIMATE CHANGE

International Conference on Nature-Based Solutions for Water Circularity and Sustainability

The 21st Jeremy Grantham lecture

Open Day 2025

2-day training programme on Climate Change and Health

Indian Institute of Science
Bengaluru
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FROM THE CHAIR

Greetings!

In 1979, the Charney report suggested that human beings may be contributing to global warming. This was not accepted by many people. In the next few decades, more observations and models showed clearly that global warming was caused by the release of carbon dioxide by the burning of fossil fuels. At this point the sceptics argued that any attempt to reduce global warming was not possible because there was no alternative to fossil fuels. In the last two decades electricity from solar and wind has become less expensive than that from coal and hence we have the technical capability to move away from fossil fuels. At this point the problem demands overcoming challenges to the rapid decarbonization of the world. How do we convince policymakers and the public to undertake a rapid decarbonization of the world to prevent a major catastrophe for future generations? In this context the important role played by the late Pope Francis is very important. He discussed this problem in 2015 through his 184-page encyclical about climate change and our moral duty to take care of this planet. In 2018 he told the oil executives that "Civilization requires energy, but energy use must not destroy civilization!". He took steps to ensure that the Vatican will have net-zero emission by 2050. In 2023, he issued Laudate Deum which highlighted the serious consequences of climate change. He said "I ask everyone to accompany this pilgrimage of reconciliation with the world that is our home and to help make it more beautiful, because that commitment has to do with our personal dignity and highest values. At the same time, I cannot deny that it is necessary to be honest and recognize that the most effective solutions will not come from individual efforts alone, but above all from major political decisions on the national and international level." We hope the policymakers of the world will heed the advice given by the late Pope Francis.

S. K. Satheesh

INTERNATIONAL CONFERENCE ON NATURE-BASED SOLUTIONS FOR WATER CIRCULARITY AND SUSTAINABILITY

Prof. R. Srinivasan (*Sixth from left*), Visiting Prof. DCCC, among the delegates of the International Conference held from 26–28 Feb 2025.

The International Conference on Nature-Based Solutions for Water Circularity and Sustainability, organized by CDD India and the Divecha Centre for Climate Change (DCCC), IISc Bengaluru, jointly was successfully held from February 26–28, 2025, at Satish Dhawan auditorium, Indian Institute of Science (IISc), Bengaluru. The conference brought together global experts, policymakers, industry leaders, and practitioners to discuss and advance Nature-Based Solutions (NbS) for sustainable water management, climate resilience, and circular economy practices.

Key Highlights of the Conference

The event featured engaging keynote addresses, expert panel discussions, technical sessions, and interactive workshops, fostering dialogue and collaboration on NbS for addressing global water challenges. Discussions focused on leveraging ecosystem-based approaches to mitigate water scarcity, urban flooding, groundwater depletion, and water quality issues.

Thematic Sessions and Insights

The conference was structured into thematic sessions, each addressing critical aspects of NbS in water management:

Day 1 of the conference:

1. Eco-centric Approaches to used-water Management: Experts explored challenges and opportunities in managing used water, emphasizing land competition, urban local body (ULB) capacity building, and the role of diverse plant species in wastewater treatment and resource recovery.
2. Strategies for Mitigating Urban Flooding and Stormwater Management: The discussions highlighted the need for integrated planning and a risk-based approach to flood mitigation. A key takeaway was the importance of conceiving flood mitigation as a single project rather than fragmented efforts.

Day 2 of the conference:

1. Sustainable Management of Groundwater Resources: Insights were drawn from Bangkok's groundwater regulation strategies, the water-energy-food nexus, and challenges like groundwater over-extraction for agricultural purposes. The role of the private sector and community engagement was also a focal point.
2. Enhancing Water Quality Through NbS: Discussions covered geogenic pollutants in groundwater, the importance of water quality monitoring, and solutions like biosand filters for improving water safety.
3. Managing Water Bodies & Wetlands for Aquatic Ecosystems: Case studies from Lucknow, Coimbatore, Bengaluru, and Alleppey demonstrated how NbS can effectively restore and manage water bodies and wetlands.

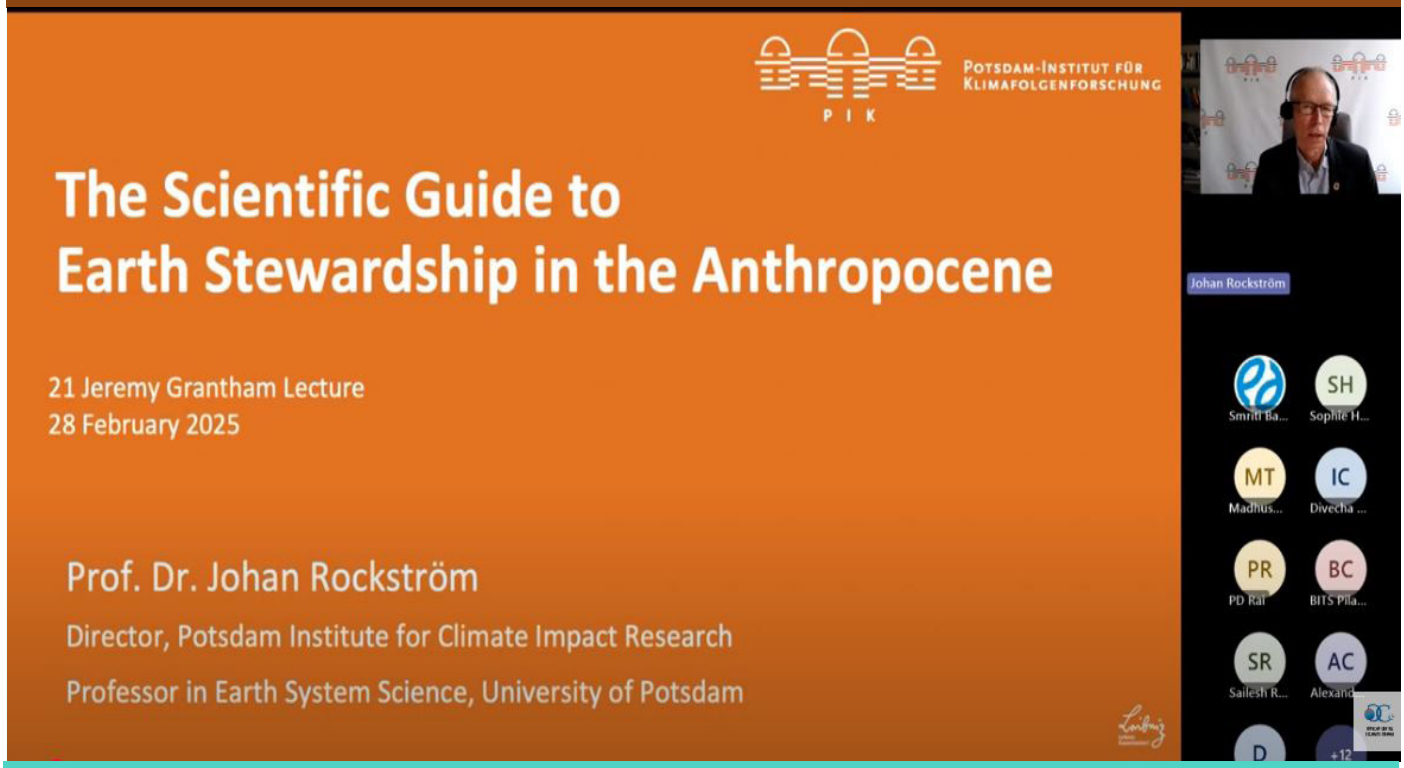
Day 3: Paper Presentations

The third day was dedicated to paper presentations, showcasing innovative research on NbS applications in wastewater treatment, urban resilience, groundwater management, and ecosystem restoration. Researchers from leading institutions and organizations presented studies on:

- Eco-town planning for urban resilience
- Nature-based wastewater treatment in Himalayan regions
- Faecal sludge quality and regulatory frameworks
- Circular economy approaches for sustainable faecal sludge management
- Rainwater harvesting and managed aquifer recharge strategies

As we move forward, we hope that the discussions and collaborations initiated at this conference will inspire real-world implementation of Nature-Based Solutions to address pressing water challenges.

THE 21ST JEREMY GRANTHAM LECTURE



Prof. Dr Johan Rockström delivering the Grantham lecture on 28th Feb 2025.

Divecha Centre for Climate Change organized the 21st Jeremy Grantham Lecture webinar on 28th Feb 2025. The topic was "The Scientific Guide to Earth Stewardship in the Anthropocene" by Prof. Dr Johan Rockström, Director, Potsdam Institute for Climate Impact Research (PIK), University of Potsdam. The Planetary boundaries framework sets out to quantify the safe operating space for humanity on Earth, for all the biogeochemical and physical processes and systems that regulate the state, resilience and life-support on Earth. The science is translated through many methods and approaches, to science based targets, that can be operationalised for nations, businesses, cities, sectors.

The Anthropocene signifies the start of a no-analogue trajectory of the Earth system that is fundamentally different from the Holocene. This new trajectory is characterized by rising risks of triggering irreversible and unmanageable shifts in Earth system functioning. We urgently need a new global approach to safeguard critical Earth system regulating functions more effectively and comprehensively. The global commons framework is the closest example of an existing approach with the aim of governing biophysical systems on Earth upon which the world collectively depends.

Derived during stable Holocene conditions, the global commons framework must now evolve in the light of new Anthropocene dynamics. This requires a fundamental shift from a focus only on governing shared resources beyond national jurisdiction, to one that secures critical functions of the Earth system irrespective of national boundaries.

Dr. Rockström proposed a new framework—the planetary commons—which differs from the global commons framework by including not only globally shared geographic regions but also critical biophysical systems that regulate the resilience and state, and therefore liveability, on Earth. The planetary commons act as an innovative path to safeguard planetary resilience and justice that must be achieved through stewardship obligations. The new planetary commons should articulate and create comprehensive stewardship obligations through Earth system governance aimed at restoring and strengthening planetary resilience and justice. He went on to argue that recognizing the critical biophysical systems that regulate the Earth system as "planetary commons" is an essential part of such a shift.

Dr. Rockström concluded his talk by deliberating that a planetary commons framework is required for humanity to navigate the Anthropocene by first summarizing the evidence of risks of Earth system disruption, loss of Earth resilience and tipping cascades, and associated patterns of increasingly acute planetary injustice resulting from these disruptions.

FE WEBINAR "MELTING REALITIES THE URGENT NEED FOR A GLACIAL LAW AND GOVERNANCE FRAMEWORK IN INDIA"

Dr Smriti Basnett, Consultant Scientist, DCCC discussing with other panelists on 21st January 2025.

The Future Earth Global Secretariat Hub South Asia, DCCC, hosted an online panel discussion on "Melting Realities: The Urgent Need for a Glacial Law and Governance Framework in India", on 21st January 2025. This online side event was a part of the program for the official launch of the International Year of Glaciers' Preservation. Dr. Smriti Basnett, Consultant Scientist, DCCC was one of the panellists. This initiative aims to enhance global awareness of the indispensable role glaciers play in maintaining the Earth's climate balance, while addressing the profound economic, social, and environmental challenges posed by changes in the cryosphere.

The Himalayan region, often referred to as the "Third Pole," harbours the largest concentration of glaciers outside the polar regions. These glaciers are vital water sources for millions across South Asia, sustaining livelihoods, ecosystems, and regional economies. However, the impacts of climate change have accelerated glacial melt, erratic weather patterns, and water resource vulnerabilities that pose significant risks to this fragile ecosystem. India, as a key stakeholder in the Third Pole, faces critical challenges in addressing these vulnerabilities. Despite the urgent need for intervention, the absence of a dedicated glacial law or

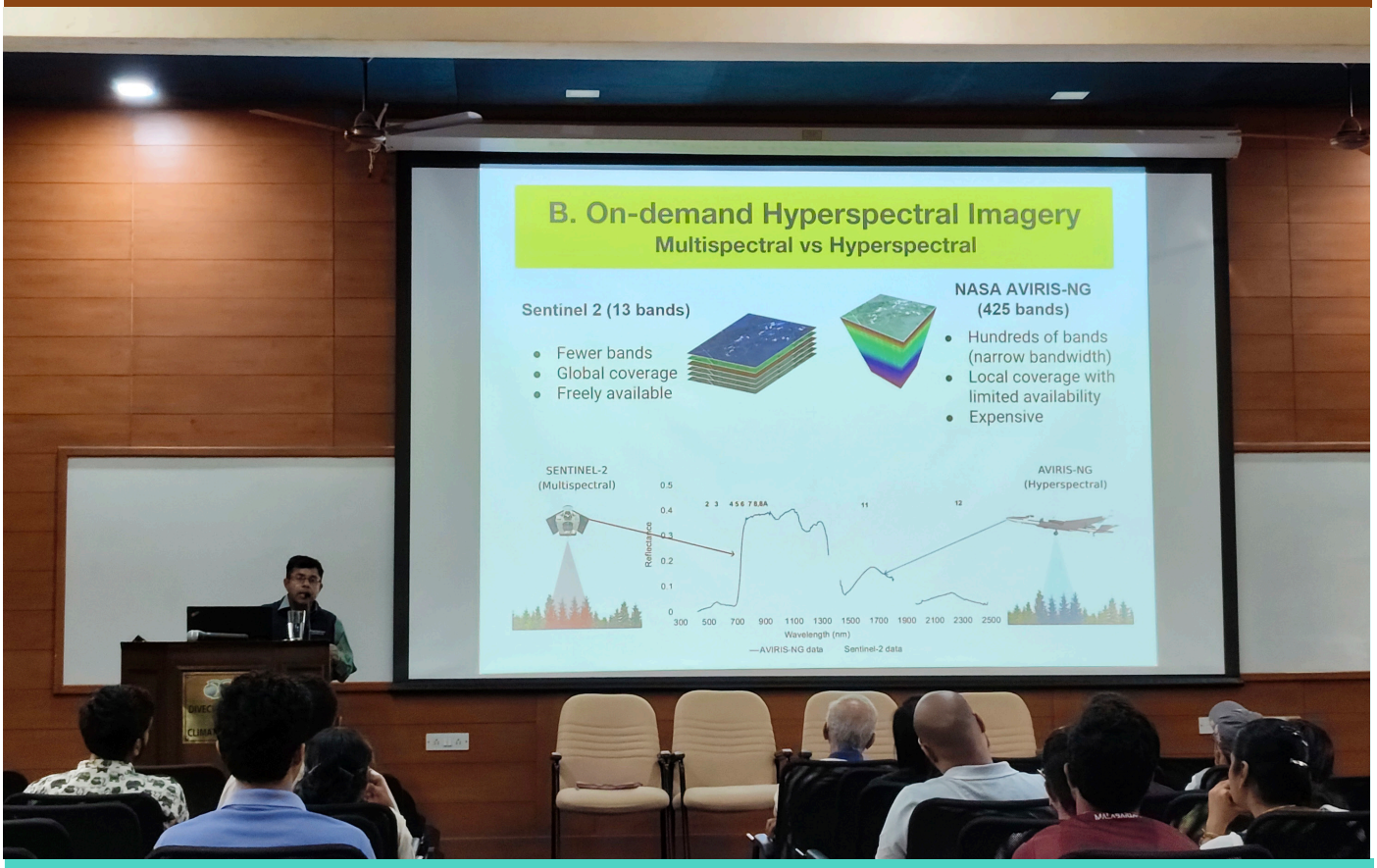
governance framework exacerbates the threats to these ecosystems and the communities dependent on them. Current policies fail to account for the unique complexities of glacial ecosystems, leaving a significant gap in climate resilience and sustainable development efforts.

This webinar sought to commemorate this significant UN initiative by exploring the intersection of climate science, policy, and governance. This program sought to underline the significance of glaciers as vital water sources and climate regulators while emphasizing the urgent need for robust legal and governance frameworks to address their conservation. Through expert-led discussions, case studies, and actionable policy recommendations, the event created awareness and encouraged multi-stakeholder participation in preserving these fragile ecosystems.

The webinar highlighted the following issues

1. The significance of the Himalayan glaciers in global water security and climate systems.
2. Identified the gaps in existing policies
3. The need to adopt global best practices in integrating science, policy, and community engagement for glacial conservation.
4. The need to foster international collaboration and raise awareness about the urgent need for action to protect the Third Pole.

ADVANCES IN GEOSPATIAL DATA SCIENCE IN NATURAL RESOURCE APPLICATIONS



Dr. Santosh Panda, Associate Professor of Geographic Information Science, Department of Natural Resources and Environment at the University of Alaska Fairbanks delivering his talk on 12th February 2025.

The Divecha Centre for Climate Change organized a seminar on “Advances in Geospatial Data Science in Natural Resource Applications: Case Studies from Alaska” by Dr. Santosh Panda, Associate Professor of Geographic Information Science, Department of Natural Resources and Environment at the University of Alaska Fairbanks on 12th February 2025.

Geospatial science and technology have transformed how government agencies, businesses, and society at large address critical challenges. Academics and entrepreneurs continue to innovate, leveraging geospatial tools to advance scientific research and societal wellbeing. With the rapid evolution of technology, new applications emerge through the convergence of geospatial science with other cutting-edge tools, reshaping the way researchers analyze and utilize data.

In this talk, Dr. Panda highlighted the latest developments in geospatial

science and technology, focusing on their application in natural resource management. The presentation covered relevant research and academic programs at the University of Alaska Fairbanks, recent advancements in geospatial data science, and their role in addressing natural resource challenges in Alaska.

He presented the following case studies:

1. Case Study1: On-demand AVIRIS-NG hyperspectral image generation from Sentinel 2 satellite image for natural resource applications
2. Case Study2: Long-term forest health monitoring using Landsat time-series data and assessing fire and climate impacts on boreal forest health
3. 3. Case Study3: Permafrost research in Alaska

Prof. J. Srinivasan presenting the token of appreciation to Dr. Santosh.

OPEN DAY 2025

Prof. Dr. H. Paramesh, Visiting Prof., DCCC, delivering a talk on Climate and Health to school children on Open Day.

The annual event called “Open Day” was organized on 1st Mar 2025 at the Indian Institute of Science campus to showcase its ongoing research activities to the public. On this day, students, science and technology enthusiasts, and the public had an opportunity to visit the Institute and go around the campus to explore the exciting science and technology initiatives and activities of the Institute. The Open Day featured popular lectures, experimental demonstrations, poster presentations, quiz contests, scientific competitions, and exhibitions hosted at various departments and Centers.

The faculty, staff and students of Divecha Centre for Climate Change also exhibited a number of experiments, posters and organised quiz programs for the visitors. The Aerosol Lab demonstrated live experiments on “Light scattering by atmospheric aerosols” and “Measurement of soot/black carbon particles”. They displayed posters on “Aerosols measurement and instrumentation”, “Black carbon from urban and rural region of India”, and “Basics of atmospheric aerosols”.

The Future Earth team had put up posters and showcased demonstrations on “10 New Insights into Climate Science”, “Responsible Consumption”, “Food Chart”, and “Know Your BM”. The Plant Science team demonstrated experiments on “Agroecosystems and Smart Irrigation to Save the Planet”, “How Plants Shield Against Soil Erosion”, “Nature’s Cry: Effect of acid rain on plant life”, “Water Bodies in Trouble: Fertilizer Pollution”, “Healthy Soil, Healthy Plants, Healthy You”, “Small Bites/ Big Impact: How food choices affect the climate”, and “Microbes in food production and combating malnutrition”. They also had put up posters on “Plant-microbe interactions and food security”.

The Water Quality Lab displayed posters on “Health effects of chemical contaminants in drinking water”, “Micro plastic contamination in drinking water”, “Conjunctive use of surface and groundwater for sustainable development of water resources”, and “Water from Air”. The Energy Policy team displayed posters on “Women and Climate Change”. The Health team displayed posters on “The sensitizing on Air pollution on human health”, and “Climate change impact on the planet and human body”. Overall the event was a grand success.

Prof. J. Srinivasan conducting the quiz program for school children on open day.

Visitors viewing posters and experiments and interacting with DCCC staff and students on Open Day.

VISIT OF SCHOOL CHILDREN FROM NIAS

School children interacting with DCCC faculty on 11th Feb 2025.

Children from various schools visited the DCCC Centre as part of the Winter Residential Workshop conducted by NIAS on 11th Feb 2025. Specially gifted children from various schools across the country visited the Centre along with their teachers and facilitators, each bringing with them a unique set of experiences and perspectives. Various DCCC faculty gave talks on different climate related topics and interacted with the children. Dr. H. Paramesh, Visiting Prof., DCCC spoke about “Air quality and Impact of air pollution on children”, and Dr. Raj Kishore, Visiting Prof., DCCC deliberated on “Food & Water Security & Environment change impact”. A short film on the DCCC Centre were also shown to these children. This was followed by an interaction session where the faculty answered questions asked by the children.

School children with their teachers and faculty of DCCC.

2-DAY TRAINING PROGRAMME ON CLIMATE CHANGE AND HEALTH

Dr. Harish M. delivering his talk at the health training program held during 14th and 15th March 2025.

The Divecha Centre of Climate Change, IISc. organized the fourth edition of the comprehensive two-days training program for the health professionals entitled “Health in A Changing Climate: Empowering Health Professionals” on 14th and 15th March 2025. This certificate-based training program, organized by Prof. S.K Satheesh, Prof. Dr Paramesh H., Dr Rohini Mattoo and Dr Sushi Kadanakuppe, aimed to equip health professionals and educators with the knowledge and skills needed to address health risks linked to climate change.

Health professionals play a crucial role in protecting communities from the growing health impacts of climate change. There is an urgent need for them to assess risks, implement interventions, and enhance public awareness through effective communication (WHO). Recognizing that this responsibility extends beyond healthcare, the program now welcomes professionals from various fields to foster interdisciplinary collaboration and maximize its impact.

The program opened with insightful sessions delving into air, water, soil pollution and natural disasters and their impact on respiratory health, neonatal well-being, and disease risks, along with climate-driven health challenges like memory loss, rural health vulnerabilities, and disaster

impacts. Experts also addressed noise pollution, anaphylaxis emergencies, and cryospheric changes, emphasizing adaptation strategies. Scientists and doctors delivered in-depth presentations, outlining the scientific basis, key data, and health risks of each topic, along with their community impact.

The second day of the program featured brief 15 min lightning talks and interactive workshops, covered topics such as emerging environmental health concerns, including light pollution, green space preservation, soil health, diabetes, and physical disabilities. Sessions also covered e-vaping risks, environmental radiation, forests in climate mitigation, underscoring the deep ties between environmental change and public health. Moreover, a quiz on the basics of atmospheric science, conducted by Prof. Dr. Paramesh H, received enthusiastic appreciation from all participants. Mr. Naveenachar, and Ms. Bhavya R. Anchalkar conducted an engaging group activity where the participants collaborated in groups, analysed real-world scenarios, and presented their insights, fostering meaningful discussions and practical solutions.

Overall, this training programme was an impactful and interactive experience, giving participants an awareness on the climate-related health challenges and empowering them to take action.

Participants and delegates who attended the training programme conducted during 14-15 March 2025.

IMPACT OF TOBACCO ON HUMAN HEALTH

Dr. Murali Mohan B.V., Senior Consultant at Narayana Health Bengaluru delivering his talk on 27th March 2025.

The Divecha Centre for Climate Change organized a seminar on “Impact of Tobacco on Human Health” by Dr. Murali Mohan B.V., Senior Consultant at Narayana Health Bengaluru on 27th March 2025. Tobacco use is widely prevalent in India. It is a major cause of public health problems in the country. Tobacco is not only a health issue but also an environment issue.

Dr. Murali in his talk, gave an estimation of tobacco consumption in India. He presented tobacco consumption prevalence done on specific groups such as industrial workers, media personnel, college students, medical personnel, and other such groups. He explained in detail each component and chemicals used in tobacco and the harmful effects it causes on human health. All forms of Tobacco are harmful on our health either smoking or smokeless tobacco. It increases the risk of various disease and shortens the lifespan. Tobacco smoke increases the probability of occurrence of cancer, heart disease, stroke, vascular disease, chronic lung diseases-COPD, type-2 diabetes, fertility issues, visual and hearing loss. Dr. Murali also explained the harmful effects both short term and long term of passive smoking. He graphically represented the ecological effects of the tobacco and its annual carbon footprint of the cigarette industry.

THE 2ND INTER-CLUSTER MEET ON SMART AGRICULTURE

The 2nd Inter-Cluster Meet on Smart Agriculture held on 17th January 2025, under the aegis of the Office of the Principal Scientific Adviser (PSA) to the Government of India.

Members of Bengaluru Science & Technology (BEST) Cluster, Joint and Deputy directors of Agriculture, Government of Karnataka, Agri tech innovators and Dr Rohini Mattoo (Divecha Centre for Climate Change, IISc., Bangalore)

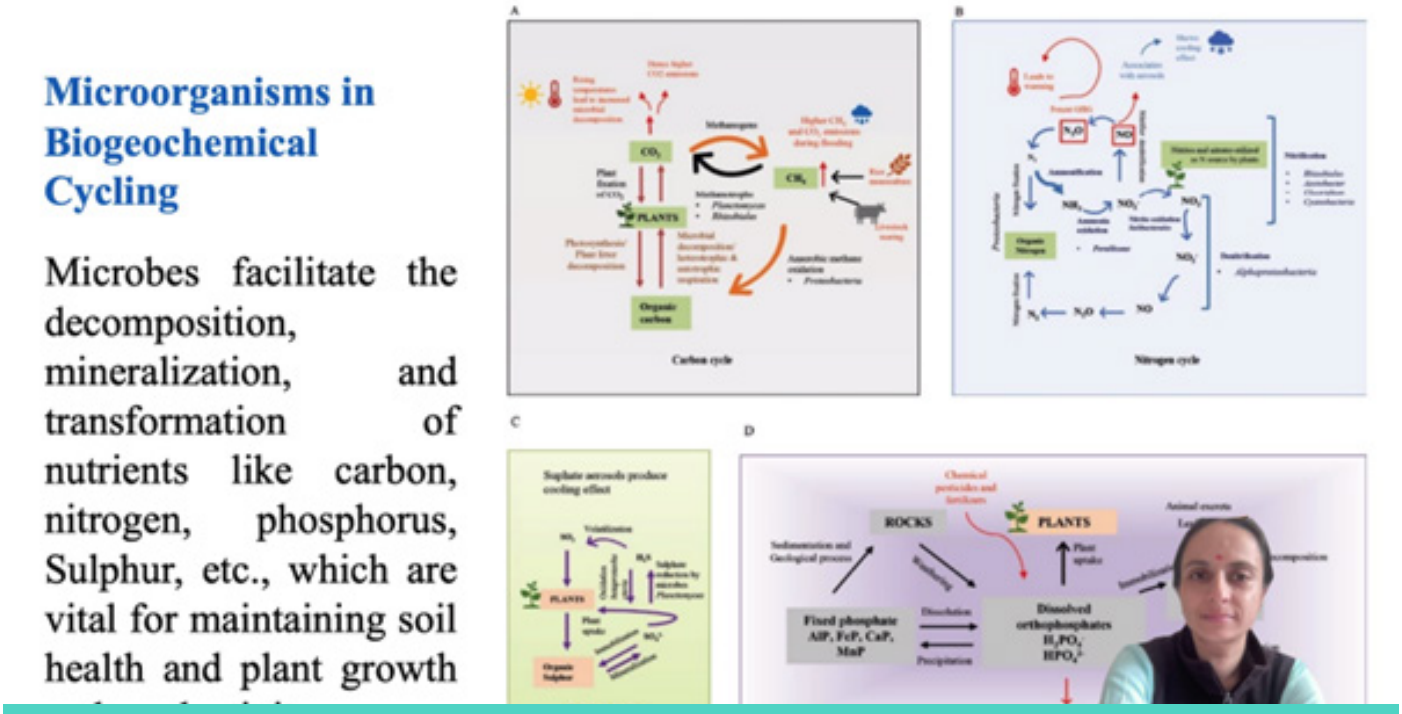
On January 17th 2025, the Office of the Principal Scientific Adviser to the Government of India hosted the 2nd Inter-Cluster Meet on Smart

Agriculture. In order to discuss and create workable ideas for a sustainable agricultural future, the event gathered Agri-innovators, government agencies, academics, industry players, Agri-incubators, and entrepreneurs. Several Science & Technology (S&T) Clusters were represented at the session, which was chaired by Dr. Vishal Choudhary (Scientist 'F', O/o the Principal Scientific Adviser (PSA) to the GoI). Participants included members of Office of the Principal Scientific Adviser to the Government of India, BeST - Bengaluru Science and Technology Cluster, Bhubaneswar City Knowledge Innovation Cluster Foundation, Pune Knowledge Cluster, DRIIV: Delhi Research Implementation and Innovation | Research and Innovation Circle of Hyderabad etc. The Deputy Director and Joint Director, Agriculture, Government of Karnataka were also present.

Dr Rohini Mattoo, Researcher, Divecha Centre for Climate Change, presented strategies for crop productivity with respect to soil health and discussed what would be important for sustainable agriculture in the context of climate change. Other topics of discussion included the agricultural value chain, healthy seeds, soil health (or enhancing productivity and post-harvest results), and bolstering the ecosystem for farmers through capacity-building initiatives were among the topics of discussion.

The initiative was coordinated by Principal Investigator of Ropar Regional Accelerator for Holistic Innovations Foundation (PI-RAHI), an enabling agency, to promote cooperation and creativity for the transformation of agriculture. Acknowledgment was given to the Office of the Principal Scientific Adviser (PSA) for facilitating influential consortiums that promote significant discussions and practical results. The significance of creating a tech-enabled, sustainable future for Indian agriculture was reaffirmed at this meeting. The aim also included working together to strengthen Atmanirbhar Bharat and open the door to a more smart agriculture.

MILLETS FOR CLIMATE RESILIENT AGRICULTURE AND FOOD SECURITY IN INDIA



Dr. Rohini Mattoo, Researcher, Divecha Centre for Climate Change delivering her talk.

The Amity University Uttar Pradesh, Noida Campus, in collaboration with the Council of Scientific & Industrial Research (CSIR), Ministry of Science & Technology, Govt. of India, organised a 3-day International Conference on Millets (ICM) from 22 to 24 January 2025 titled “Millet Fusion: Cultivating Sustainability, Nourishing Nations”. The conference focused on the utilization of millets in promoting sustainability, health, and innovation.

Dr Rohini Mattoo, from Divecha Centre for Climate Change, won first place for her presentation of her research work on millets. She spoke on how the work contributes to not only advancing science, but also improving society and environment. Dr. Rohini spoke on how the millet rhizosphere is home to a diverse and beneficial microbial community that serves a variety of functions for climate resilience, food security, overcoming malnourishment etc. Microbial diversity and abundance play a crucial role in reducing greenhouse gas emissions from agricultural soils, retaining water, decomposing organic matter, and weathering.

THE 2024 GLOBAL NITROUS OXIDE ASSESSMENT OF THE CLIMATE AND CLEAN AIR COALITION: AN EXAMPLE OF HUMAN ALTERATION OF THE GLOBAL NITROGEN CYCLE

Prof. Eric A. Davidson, Professor, University of Maryland Center for Environmental Science delivering his talk on 28th April 2025.

The Divecha Centre for Climate Change organised a seminar on "The 2024 Global Nitrous Oxide Assessment of the Climate and Clean Air Coalition: An Example of Human Alteration of the Global Nitrogen Cycle", by Prof. Eric A. Davidson, Professor, University of Maryland Center for Environmental Science, Fulbright-Nehru Distinguished Senior Scholar, Hosted by Guru Gobind Singh Indraprastha University, New Delhi, Former President, American Geophysical Union, on 28th April 2025.

Nitrous oxide (N_2O) concentration in the atmosphere is increasing exponentially, due primarily to the inefficient use of fertilisers in global food production systems. N_2O is the third most important anthropogenic greenhouse gas (following carbon dioxide and methane) and is the largest currently emitted stratospheric-ozone-depleting substance. The Climate and Clean Air Coalition of the United Nations Environment Programme conducted a global assessment of the sources and trends of N_2O emissions, their impacts on the environment and human health, and abatement opportunities. N_2O is part of the nitrogen (N) cycle, which is

essential to all life on Earth. The N cycle has been profoundly altered by human activities, including agriculture, fossil fuel combustion, industrial production, biomass burning, and wastewater management. Abatement of anthropogenic N_2O emissions must be grounded in sustainable nitrogen management approaches across economic sectors and scientific disciplines. Due to strong linkages among forms of N in the N cycle, co-benefits of N_2O abatement can provide concomitant reduction of other forms of N pollution that also affect environmental quality and human health, such as ammonia, nitrogen oxides, fine particulate matter (PM2.5), and nitrate leaching. Some abatement measures are already technically and economically feasible, but others, particularly those related to agricultural emissions, will require ambitious policy initiatives and technological development.

Prof. Davidson concluded his talk by highlighting that mitigation of N_2O requires a sustainable N management approach, which would also reduce NOx and NH_3 emissions, improving air quality now (NO_2, O_3, PM2.5), reducing eutrophication of water bodies, and avoiding nitrate contamination of drinking water. Lower PM2.5 will have a short-term warming, but reduced warming will occur in the second half of the 21st century, due to N_2O's long atmospheric lifetime.

Prof. Eric A. Davidson, Professor, University of Maryland Center for Environmental Science with the Chair, DCCC and other faculty, students, and staff of DCCC.

RESEARCH HIGHLIGHTS

A FUZZY FRAMEWORK FOR RISK ANALYSIS OF DAM-BREAK FLOOD IN CLIMATE CHANGE SCENARIOS

In recent decades, there has been an alarming increase in dam break flood (DBF) events across the globe. Majority of those events are caused due to intense flood inflows into dam's reservoir that could not be safely managed by spillways. Such inflows are largely attributable to variation in spatiotemporal patterns of extreme storms under changing climate. A novel method is proposed in a fuzzy framework to facilitate effective assessment of the DBF risk in a changing climate. It uses a proposed Modified Aggregate Risk Index (MARI) to integrate information on three risk indicators (likelihood of DBF, severity of consequent hazard, and exposure to DBF). The last among those (i.e., exposure to DBF) is quantified by aggregating information on fourteen indicators depicting losses to life, economy, society and environment (shown in figure) using a new aggregate exposure index. The method can incorporate uncertain, ambiguous, and vague information on risk indicators, which is not possible with conventional risk assessment methods. Its effectiveness is demonstrated through a study on the Hemavathy Dam (India) and its floodplain considering simulations of hydrometeorological variables from eleven CMIP6 GCMs corresponding to four climate change scenarios (SSPs: 126, 245, 370, and 585). Risk maps are created at village scale showing future projections of DBF risk under various climate change scenarios. Information discernible from the maps would be helpful to dam owners and policymakers in prioritising villages at high-risk for devising flood risk mitigation/management strategies.

Reference: Anubhav Goel, V. V. Srinivas (2025), A fuzzy framework for risk analysis of dam-break flood in climate change scenarios. International Journal of Disaster Risk Reduction, Elsevier, February 2025. https://doi.org/10.1016/j.ijdrr.2025.105322.

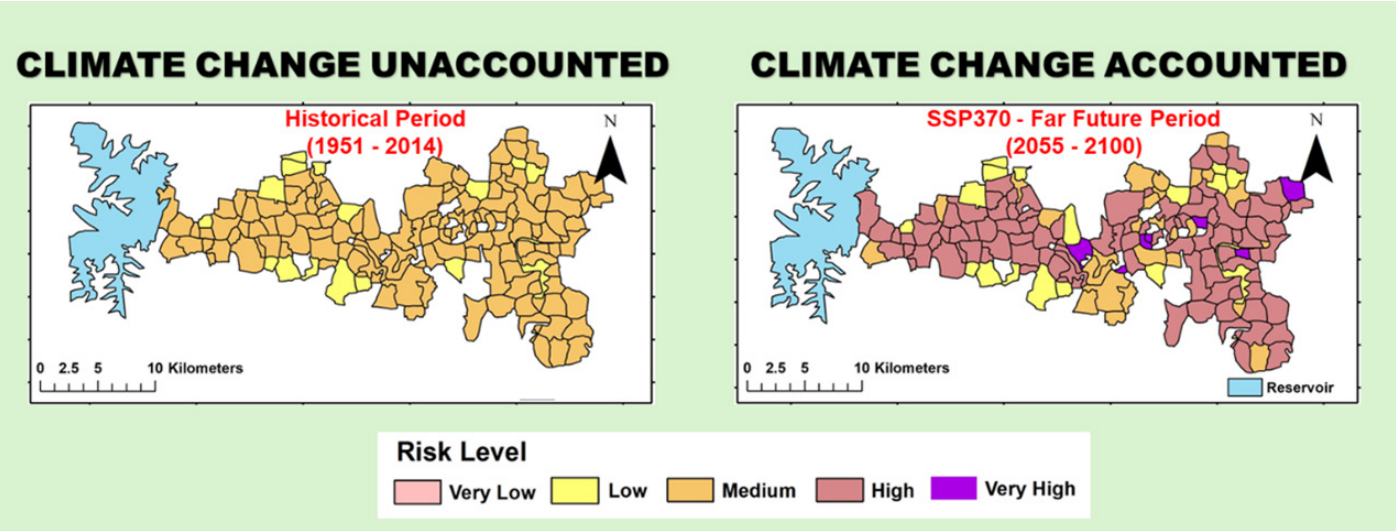


Fig: PMF: Probable maximum flood; SSP: Shared Socioeconomic Pathway.

THE IMPACT OF GLACIAL LAKE OUTBURST FLOOD ON 3RD OCTOBER 2023 IN SIKKIM

The glacial lake outburst flood that occurred on 3rd October 2023 in Sikkim lead to widespread damage downstream. The collapse of frozen lateral moraine into the South Lhonak lake in Sikkim generated a 20-m-high displacement wave. The wave breached the frontal frozen moraine, causing the sudden drainage of around 50 million cubic meter of water, with a peak discharge of 48,500 cubic meter per second. This event eroded around 270 million cubic meter of sediment and triggered 45 secondary landslides. Around 31 major bridges and The Teesta III hydropower dam were destroyed. This study highlights the need to improve our understanding and quantification of cascading hazards. There is a need to study the reliance of infrastructure in order to mitigate the impact of future glacial lake outburst events.

Reference: Sattar et. al., Science 387, eads2659, 21st March 2025.

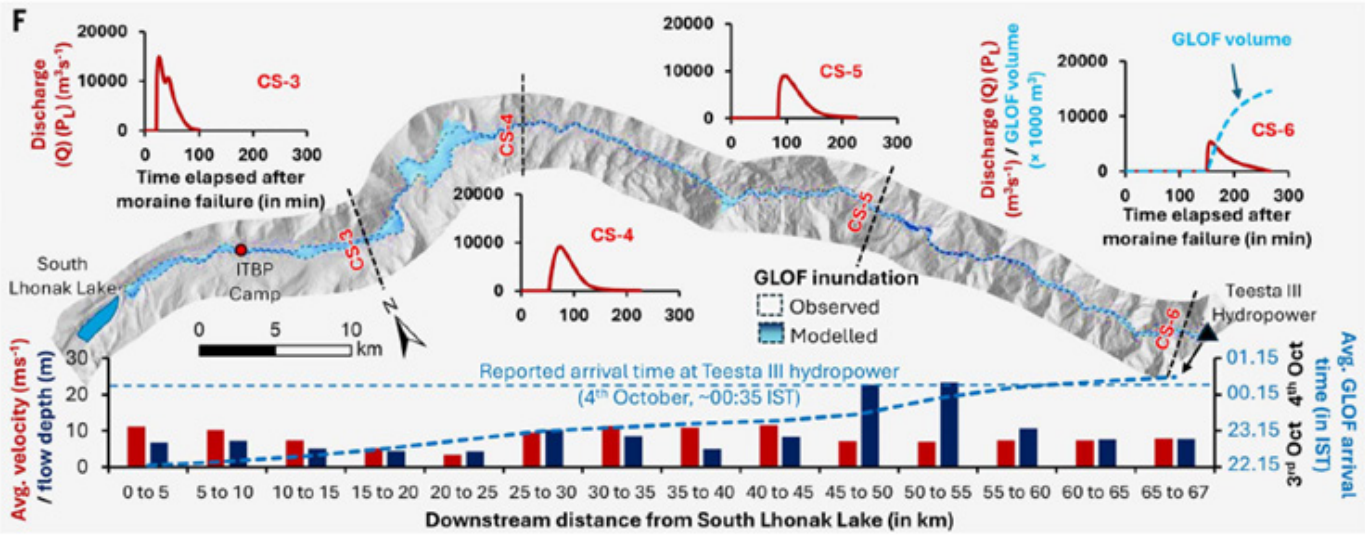
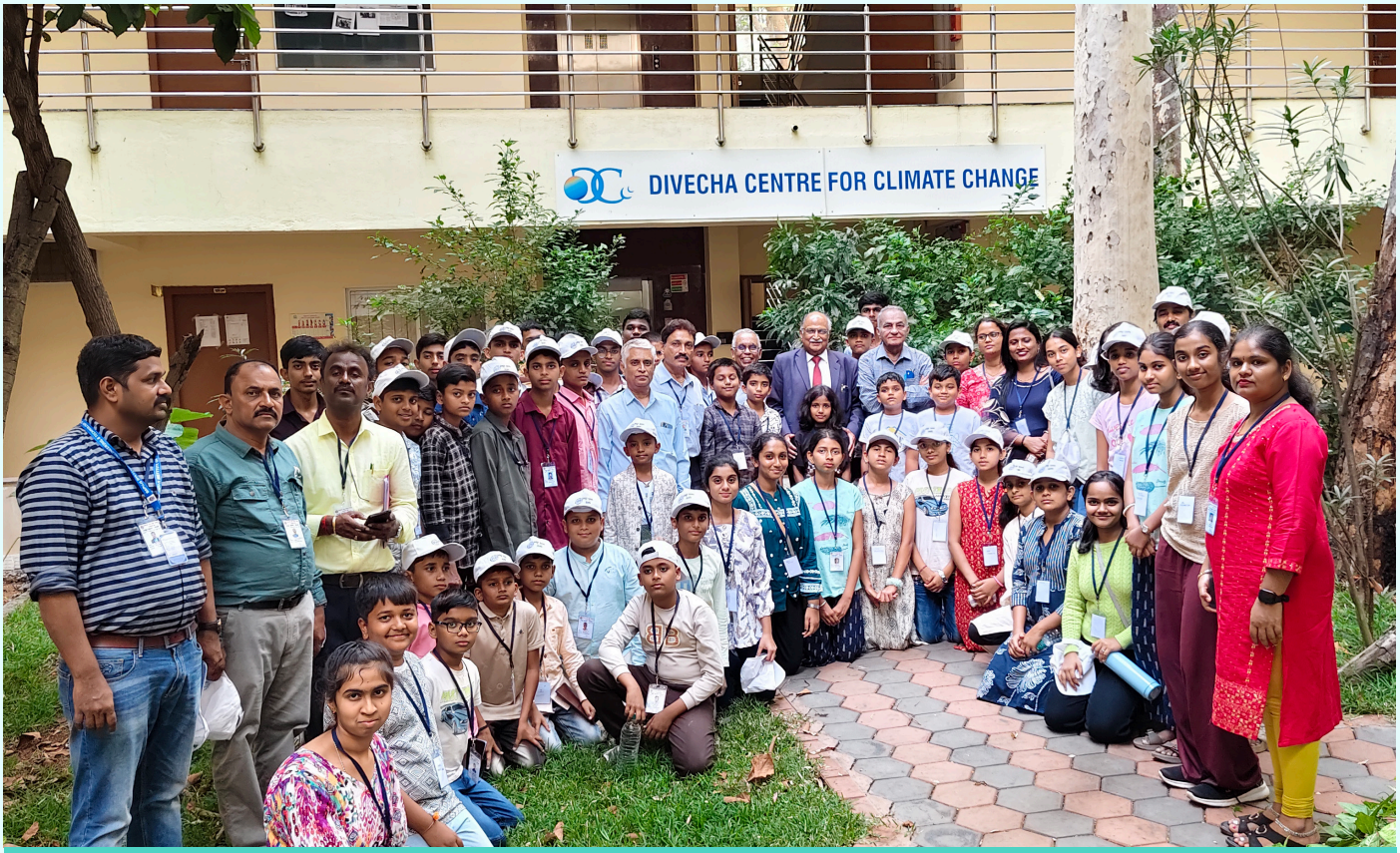


Fig: River route from South Lhonak lake to the Teesta-III hydropower dam at Chungthang; The subplots show discharge at four cross sections along the flow channel (red hydrographs). At CS-6, the time versus accumulated volume is shown (blue). Reconstructed average flow depths, velocity, and time of the flood arrival every 5 km along the flow path are shown at the bottom and matched with the reported GLOF arrival time at the Teesta III hydropower dam.

Delegates who attended the International Conference on Nature-Based Solutions for Water Circularity and Sustainability visited the DCCC Centre on 27th Feb 2025.



School students from Davangere District, Karnataka, visited the DCCC Centre on 22nd April 2025.