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RESSUMMIT 2026

REPORT

RESILIENCE AND SUSTAINABILITY SUMMIT- VISION 2047

SPECIAL FOCUS: CAPACITIES AND PUBLIC POLICY (CAPP-RES)

16-18 MARCH 2026

IIT ROORKEE,
GREATER NOIDA CAMPUS (NCR)

ORGANIZED BY

ICARS-IIT ROORKEE JOINTLY WITH NDMA, DGFASLI, DST, UNDP, FCDO, GIZ,
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**Summit Report: RESSUMMIT 2026 : Resilience and Sustainability
Summit: Vision 2047
Special Focus: Capacities and Public Policy (CAPP-RES)**

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List of Abbreviations and Acronyms

ADRA	Adventist Development and Relief Agency
ADRES	Adaptation, Disaster-Resilience, Environment & Sustainability Network
ADN	Avoidable Deaths Network
ADPC	Asian Disaster Preparedness Centre
AOEH	Association of Occupational and Environmental Health
BIS	Bureau of Indian Standards
BRB	Bal Raksha Bharat (Save the Children)
CAPP-RES	Capacities and Public Policy for Resilience
CDRI	Coalition for Disaster Resilient Infrastructure
CSTEP	Centre for Study of Science, Technology and Policy
CCA	Climate Change Adaptation
DGFASLI	Directorate General, Factory Advice Service and Labour Institutes
DRR	Disaster Risk Reduction
DST	Department of Science and Technology
EWS	Early Warning System
FCDO	Foreign, Commonwealth and Development Office (UK)
GBPNIHE	G.B. Pant National Institute of Himalayan Environment
GEAG	Gorakhpur Environmental Action Group
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
ICARS	Integrated Centre for Adaptation, Resilience and Sustainability
ICLEI	Local Governments for Sustainability
IUCN	International Union for Conservation of Nature
MoEFCC	Ministry of Environment, Forests and Climate Change
NACWC	National Authority for Chemical Weapons Convention
NAPs	National Adaptation Plans
NaTech	Natural Hazard-Triggered Technological Disasters
NbS	Nature-based Solutions
NCDC	National Centre for Disease Control
NDMA	National Disaster Management Authority
NITI	National Institution for Transforming India
OISD	Oil Industry Safety Directorate
OSDMA	Odisha State Disaster Management Authority
SEEDS	Sustainable Environment and Ecological Development Society
UNU-CRIS	UNU - Institute on Comparative Regional Integration

Studies

UNDP.....United Nations Development Programme
UNDRR.....United Nations Office for Disaster Risk Reduction
WOTR.....Watershed Organisation Trust
WWF.....World Wide Fund for Nature

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NGT*



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CSTEP*



*Dr. Nibedita S Ray-
Bennett,
ADN*

and many more...



About RESSUMMIT 2026

Background

The RESSUMMIT 2026 was a premier multi-day platform designed to advance dialogue and action at the intersection of resilience, disaster risk reduction, sustainability and public policy, in line with India's Vision 2047. It served as a global platform bringing together researchers, scientists, policymakers, practitioners, disaster responders, and industry leaders to address emerging and connected risks in the context of accelerating climate change and environmental degradation, hampering India's development trajectory. Hosted at ICARS, IIT Roorkee - Greater Noida campus (NCR) between 16 -18 March 2026, the Summit created space to ask : how do we build a resilient, developed nation without leaving its most vulnerable people and communities behind?

Vision and Rationale

Amid accelerating climate change, risks of disasters and industrial accidents, and limited resource, the Summit offers a platform for deliberation based on scientific evidence, multi-stakeholder dialogues, and knowledge sharing. It stresses the importance of enhancing the science-policy-practice link, adopting systems thinking, and capacity building for informed and resilient development. Given that India is facing compounding risks of Climate Change and Disasters at precisely the moment, it is trying to reach its Vision 2047 Goals

The Summit advances systems-based thinking, integrated risk governance, and proactive capacity development to address both long-term vulnerabilities and immediate emergencies, while promoting alignment across sectors and partners. Summit had dedicated focus on South & Southeast Asia, South - South cooperation, and global platforms including the G-20, UNCCD, and WHO.

The CAPP-RES Framework

RESSUMMIT 2026. Capacities and Public Policy (CAPP- RES) is a 3 day, high level multi-partner Summit conceptualized to bridge the gap between policy and scientific knowledge, practical implementation and strong public policy, aimed at India's Vision of 2047 of a resilient, sustainable and developed nation.

Summit Architecture

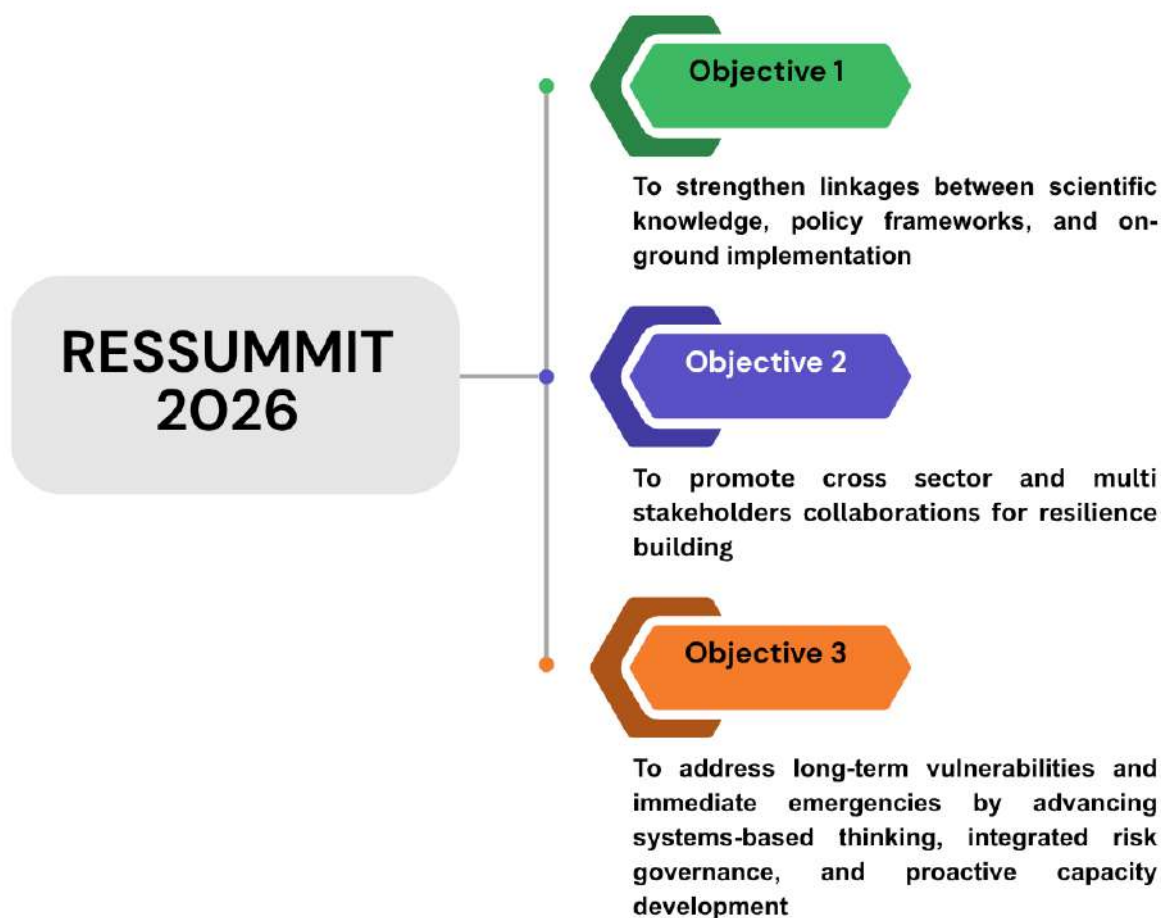
The Summit architecture was ambitious : three days, five events, over forty sessions, five parisamvaad dialogues, state of art exhibition and growing consortium of over 50 partner organizations. First Event on Day 1 was organized under aegis of Climate Knowledge Forum anchored by launch of 1st Adaptation Academy under National adaptation Conclave. Second Event and Third Events were organized on Day 2 under the aegis of India Resilience Forum : Regional & Specific Contexts with a focus on Regional Vulnerabilities and Resilience - Mountains, Desert and Coastal Risks and Human Health and Well Being respectively. On Day 3 of the Summit, Fourth and Fifth Events were organized under the aegis of Industry-Safety

and Sustainable Systems with a focus on DRR, Environment & Sustainability including Chemical-Industrial Process Safety.

Event	Day & Date	Theme
Event 1	Day 1 / 16 March 2026	Climate Knowledge Forum - National Adaptation Conclave
Event 2	Day 2 / 17 March 2026	Regional Vulnerabilities and Resilience - Mountains, Desert and Coastal Risks
Event 3		Human Health and Well Being
Event 4	Day 3 / 18 March 2026	Industry Symposium - Chemical-Industrial Safety, Environment and Sustainability
Event 5		Resilience and Sustainability Policy Outlook Symposium

Key Events





Sessions and Activities

Summit Talk and Plenary Sessions

The Summit Talk and Plenary Sessions of the RESSUMMIT 2026 were in line with the central theme of 'Capacities and Public Policy'. They provided high level platform for advancing global dialogue and collective action on climate change, disaster risk reduction (DRR), and resilience building. Key highlights of discussions were institutional strengthening, fostering community participation, knowledge dissemination, technological innovation, climate resilient development, and international development to support climate change-disaster resilient pathways.

Special Thematic Sessions

RESSUMMIT 2026 offered a dedicated platform for discussion on specialized themes focused on dialogue and knowledge exchange bringing together technical experts, academic institutions and practitioners. Running in parallel these sessions enabled institutions to showcase expertise, innovations, and best practices in disaster risk reduction and climate resilience in line with broader objective of the Summit.

Parisamvaad

Parisamvaad Sessions fostered inclusive, multi-partner dialogue through interactive, audience-engaged group discussions for live audience. These sessions enabled informed and dynamic discourse on emerging issues in disaster and climate resilience domains.

Technical Paper Presentations

The technical paper presentations provided a dedicated platform to researchers and practitioners to share evidence-based findings, innovative methodologies, and practical solutions related to disaster risk reduction. The session also aimed to support informed decision-making and strengthen collective understanding of emerging risks and resilience strategies.

Exhibition

The exhibition showcased state of art technologies for disaster preparedness and said diverse perspectives essential for strengthening preparedness. It helped experiential learning and strengthen engagement among partners.

RESSUMMIT 2026 at a Glance



Plenary Sessions 04



Top Dialogues 02



Thematic Sessions 24



Pari-Samvaad 06



Leader's Talk 01

Exhibition



Climate Knowledge Forum

Event 1

National Adaptation Conclave *1st Adaptation Academy*

*Integrating climate risk into policy and
accelerating adaptation in line with net zero
and carbon neutrality goals*

*Forum Launch, Inaugural Session,
Summit Talk Top Dialogue, Thematic
Session & Colloquy*

TIME IS RUNNING
OUT!

Day 01 | March 16, 2026



Introduction

Thematic Context

The Opening day of the RESSUMMIT 2026 in IIT Roorkee, GNEC anchored the Summit in India's National Adaptation Imperatives, drawing on the Climate Knowledge Forum and the First National Adaptation Conclave. Sessions on Day 1 examined the gap between adaptation planning and implementation - from exploring innovative financing mechanisms to showcasing Nature Based Solutions (NbS) as policy pathway. The landmark feature of the Event 1 was the First Adaptation Academy, which was focused on building high-level policy strategy across all concerned partners.

Objectives of the Climate Knowledge Forum

- Assess progress in national and sub-national adaptation planning
- Strengthen the science-policy-practice interface for climate resilience
- Showcase evidence-based NbS and wetland-based approaches
- Explore innovative finance mechanisms for adaptation and resilience
- Build and connect Climate Centres of Excellence (CoEs) into a national network

Significance of the First Adaptation Academy

The First Adaptation Academy launched as part of Event 1 which represents a landmark initiative designed to translate climate knowledge into practical public policy. The Academy provided a rigorous capacity-building platform for policy-makers, practisioners, members of academia, researchers, scientists, bureaucrats from international, national, state level institutions, civil society organizations marking an important milestone toward India's Vision 2047.



SESSION-WISE PROCEEDINGS

I001	Forum Launch - Inaugural Session 9.00 - 10.45 Main Hall
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Session Partners: NDMA, MoEFCC (Adaptation Cell), UNDP, GIZ, DST- GoI, IIT Roorkee, TU Dresden, UNDRR Incheon, GIAN & ICARS-IIT Roorkee

Speakers:

- **Prof. U. P. Singh, Deputy Director, IIT Roorkee**
- **Shri Manish Bhardwaj, IAS, Secretary – NDMA**
- **Prof. Anil K. Gupta, Emeritus Professor, IIM Ahmedabad**
- **Dr. Nisha Mendiratta, Head-CEST Division, DST-Government of India**
- **Smt. Ruchika Drall, Deputy Secretary (CC Division), MoEFCC**
- **Prof. Anil K. Gupta, Professor, WRDM IIT Roorkee, PI-ICARS-IIT Roorkee**
- **Dr. Sanjay Bhatia, Head, UNDRR-GETI, Incheon**
- **Dr. Andre Lindner, Managing Director, ABCD Centre – TU Dresden**
- **Shri Kirtiman Awasthi, Senior Advisor and Project Head, CAFRI-GIZ India**

Welcome Remarks

Prof. Anil K. Gupta (PI, ICARS-IIT Roorkee) welcomed all delegates and begun the Inaugural session by placing RESSUMMIT 2026 as a collective endeavour belonging to growing consortium of over 50 organizations with common shared purpose. Prof. Gupta recalled the First Edition of the RESSUMMIT, held in year 2023 at Vigyan Bhawan, New Delhi, had been received with considerable appreciation and outcomes of which were directly fed into the National Platform for Disaster Risk Reduction.



“The RESSUMMIT is an effort towards translating research knowledge towards policy and action strategies. To mention, the 2023 edition fed to national processes of NPDRR and NMSKCC and set the step for second edition – RESSUMMIT 2026”

One of the most important key recommendation from previous edition was to strengthen the science -policy-practise interface on climate knowledge had become driving mandate for



ICARS. Prof. Gupta placed the Summit within the broader policy framework of the National Mission for Strategic Knowledge on Climate Action Plan on Climate Change (NMKCC) led by Department of Science and Technology under National Plan on Climate Change (NAPCC) and said that current work at ICARS-IIT Roorkee is in alignment with NMKCC core objective of translating research knowledge into strategic knowledge.

Prof. Gupta warmly acknowledged the presence of Padma Shri awardee Prof. Anil K. Gupta (Honey Bee Network) and Dr. Andre Lindner from TU-Dresden. He expressed his gratitude to Shri Kirtiman Awasthi and GIZ for their continued support in advancing climate knowledge and networking and to Shri Manish Bhardwaj, IAS Secretary-NDMA and NDMA. Dr. Sanjay Bhatia from GETI-UNDRR.

Prof. Gupta outlined the architecture of the RESSUMMIT 2026 - A three day event comprising of five thematic events, with over 40 Sessions and 05 specially curated sessions called Parisamvaad, envisioned as dynamic, globally live streaming platform for dialogue and discussions. The five thematic events spanning across the Summit were introduced. Day 1 focusing on the Climate Knowledge Forum - National Adaptation Conclave - 1st Adaptation Academy under NMSKCC. Day 2 of the RESSUMMIT 2026 covered Regional Vulnerabilities across all ecosystems as well as Resilient Public Health System and Emergencies. and Last day of the Summit was dedicated to the Disaster Risk Reduction, Environment and Sustainability with focus on Chemical-Industry Process Safety, addressing industrial hazards and adaptation imperatives for industrial systems.

Prof. Gupta ended by highlighting the unique position of ICARS as an initiative working across 12 ministries, NITI Aayog, NDMA, MoEFCC, DST and IMD while fostering international cooperation and industry partnership. He said ICARS as a network being built by connecting Centre of Excellence on Climate Change and Disaster Management, State Climate Change Cells and SDMA's.

Special Address

Prof. Anil K. Gupta (Professor Emeritus-IIM A ; GIAN ; Honeybee Network) opened his address with a basic assertion that set the intellectual tone for the entire Summit - ***Societies which adapt also innovate***. Without innovation, he said, adaptation is impossible and crucially, innovation must be understood as technological advancement but as institutional transformation.

Prof. Gupta drew the audience into a 2,000-year-old Buddhist parable in which a teacher repeatedly asked a student to recount what he had done after fetching a glass of water. The student's eventual realisation that he had carelessly spilled two drops rather than returning

them to a plant became a metaphor for foresight. At a time when water was abundant, the teacher was already preparing students for scarcity two millennia away. ***Resilient systems for climate adaptation, Prof. Gupta said cannot be built reactively and must be built with foresight.***

Prof. Gupta celebrated grassroots ingenuity, citing the amphibious bicycle of Mohammad Saidullah from Motihari (Bihar) as a low-cost flood-response solution that should be at every panchayat and fire brigade station in flood-prone areas alongside deep-tech innovation such as self-healing cement inspired by coral reef microorganisms, capable of repairing earthquake-induced fissures of up to 8mm. Prof. Gupta called on DST to champion what he termed ***autopoietic systems: self-generating, self-healing, self-governed models of innovation that do not require perpetual external inputs.***



"We need to develop a culture by which the local challenges are faced by local innovations which will accumulate and aggregate together for global solutions"

Prof. Gupta made a compelling case for documenting and digitising indigenous ecological wisdom: the Jarawa tribe's reading of ocean stillness before the 2004 tsunami ; Rhododendron (*rhododendron arboreum*) flowering as a pasture-coordination signal for Himalayan herders ; Ants carrying eggs to higher ground as a rainfall predictor. Such knowledge, he urged, must be integrated into AI and Retrieval-Augmented Generation (RAG) based tools with appropriate guard rails and open-data obligations must be made enforceable for all DST and MoEFCC-funded projects.

He closed with two institutional proposals. a Disaster Management Information System (DMIS) - a voluntary real-time registry of doctors, volunteers, and responders pledging support within a defined radius and a District Innovation Fund in the forthcoming Finance Commission, disbursed directly to districts for climate resilience innovations. His closing image was arresting in its simplicity: in 7,000 kilometres of walking across India, he had found only one school with directional arrows guiding children to safety in a disaster. That, he said, must change.

Special Address

Dr. Andre Linder (Managing Director, ABCD Centre-Global Water and Climate Adaptation Centre, Technical University of Dresden (TUD), Germany) opened with a pointed reframing of a familiar idea - where the last decade proclaimed that *data is the new oil*, he offered a more generative metaphor-***data is the new soil. Something not to be extracted and exhausted, but cultivated and grown upon.***

"Let us move from fragmented reactions to integrated adaptation, and let us embed climate resilience into institutions, governance, and education"

Drawing on his background as a biologist, Dr. Linder said that the planet loses approximately 150 species daily, many unknown to science and that if properly accounted for - Germany's accumulated environmental costs now stand at €250 billion annually, equivalent to a 6% GDP growth. Economic measurement itself, he said, must be rethought.



He presented a **three-dimensional resilience framework: coping capacity, incremental adaptation, and major adaptation**, insisting all three must reinforce one another.

Water, food, energy, and biodiversity cannot be governed in silos. climate risk is inherently connected.

Universities, he said, carry a special responsibility not as distant observers but as inventive, transformative, and engaged partners. He said the Indo-German Joint Master's Programme on Water Security and Global Change, recently awarded the IHP-UNESCO label, and the newly established UNU-TUD CREST Hub as concrete platforms translating this philosophy into action.

Opening Remarks

Prof. A.P. Singh (Deputy Director, IIT Roorkee) extended a warm welcome to all delegates at IIT Roorkee's Greater Noida Campus. Prof. Singh situated IIT Roorkee's participation in its 177-year legacy as a pioneering research and development institution, one that has consistently believed in the power of science and technology to drive socioeconomic development. He said the Institute's expanding research ecosystem, spanning Centres for Sustainable Energy, Dams, Indian Knowledge Systems, Drone Research, ISRO-Space



“Science and Technology hold immense potential for socio-economic development. What we need now are stronger policies to address climate change and disaster resilience”

Technologies, DRDO-Industry-Academia Excellence, Railway Research.

Prof. Singh invited all partner academic institutions to use IIT Roorkee's multidisciplinary expertise and expressed confidence that three days of deliberation by scientists, policymakers, and industry partners would yield concrete, implementable policy recommendations - translating scientific knowledge into practical governance frameworks for climate change and disaster management.

Inaugural Address

Shri Manish Bhardwaj, IAS (Secretary, National Disaster Management Authority) delivered the Inaugural Address online, commending the organisers for convening a forum that brings

together scientific knowledge, policy frameworks, and implementation capacity at a moment of growing urgency.

He said that disaster risks are more complex, climate change, environmental degradation, rapid urbanisation, and technological hazards are interacting in ways unanticipated even a decade ago. India has made important strides in early warning, evacuation planning, and inter-institutional coordination, saving thousands of lives. Yet the challenge has shifted from managing single hazards to navigating multi-hazard and cascading risks - floods stressing urban infrastructure, heatwaves intersecting with public health, and environmental stress driving migration.

He said **four emerging priorities** : **translating climate adaptation plans into ground-level implementation ; advancing anticipatory action and early warning systems that trigger effective last-mile response : including ecosystem-based approaches ie. wetlands, mangroves, and healthy watersheds into disaster risk planning ; and ensuring that AI and digital tools remain inclusive, ethical, and accessible** to the most vulnerable. Anchoring his address in India's Viksit Bharat 2047 vision, he said that long-term national development must be resilient, sustainable, and fundamentally risk-informed.



“Addressing the complexity of climate change requires integrated governance, coordinated planning, and timely financial mobilization that delivers real impact on the ground”

Remarks



“As disasters grow more complex with rapid urbanization and technology, resilience must combine early warnings, community preparedness and ecosystem based approaches”

Ms. Ruchika Drall, (Deputy Secretary, Climate Change Division. Ministry of Environment, Forest and Climate Change) opened by affirming that for India, climate adaptation is not just a environmental response, it is a fundamental development priority, inseparable from the nation's Viksit Bharat 2047 vision. Extreme weather events are intensifying across all sectors, with the most severe impacts falling on vulnerable communities with the least adaptive capacity. She outlined India's policy architecture - NAPCC as the overarching framework with a majority of its missions focused on adaptation over mitigation and confirmed that the National Adaptation Plan, aimed at providing a full cross sector resilience framework, is at an advanced stage of finalisation and expected for release imminently.

Four imperatives emerged from her remarks : ***pushing adaptation planning below the SAPCC level to districts and panchayats ; bringing the financing community not just development partners but national and state fund allocators into the room ; strengthening climate modelling capacity to improve sector-specific risk understanding ; and integrating adaptation into existing institutional frameworks rather than creating parallel structures.***

Remarks

Shri Kirtiman Awasthi, (Senior Advisor & Project Head-CAFRI, GIZ India) welcomed participants on behalf of GIZ, affirming the organisation's commitment to its partnership with IIT Roorkee and ICARS. He said that global climate discourse is decisively shifting from strategy development to measurable implementation and that financing is the important bridge between the two. He said that India's current Economic Survey explicitly recognises adaptation as a developmental need encompassing stronger health systems, enhanced agricultural productivity, reliable energy access, resilient infrastructure, and water security.



“Resilience begins where ideas turn into measurable action ”

GIZ, he said, has been working alongside MoEFCC and state partners to include adaptation governance into existing developmental processes and build the institutional capacities needed to make that transition real.

Remarks

Shri Sanjay Bhatia (Head, UNDRR-GETI) representing UNDRR as custodian of the Sendai Framework, flagged a sobering finding from the 2023 midterm review. The world is falling behind on nearly

“Climate Adaptation requires robust research and strong collaboration, bringing together stakeholders and centers of excellence to drive meaningful solutions”



all global disaster risk reduction targets, risking a persistent cycle of disaster and recovery by 2030. He stressed that sustainable development is impossible without integrating disaster risk reduction and climate adaptation and that universities, the private sector, and financing institutions are important to breaking this cycle. He called for resilience to be treated as an investment, not a cost, and said innovative financing mechanisms - green bonds, resilience bonds, and climate finance as

underutilised tools. GETI-UNDRR, he said, stands ready to deepen collaboration with IIT Roorkee, ICARS, and NDMA on training and capacity development.

Remarks

Dr. Nisha Mendiratta, (Head-Scientific Division, CEST, DST) brought an institutional depth to the session, tracing DST's journey with climate change governance back to the launch of NAPCC in 2008 - 09. When two of its eight missions- ***National Mission for Strategic Knowledge for Climate Change (NMSKCC)*** and the ***National Mission for Sustaining the Himalayan Ecosystem (NMSHE)*** were entrusted to DST, recognising it as the nodal institution for science, technology, research, development, and innovation. She reflected on thirteen years of building this programme from the ground up, developing vulnerability and risk assessments down to the district level, establishing State Climate Cells across Himalayan states, and creating a network of over twenty Centres of Excellence working across climate-important sectors.



“Development thrives when investments are resilient, protected, and guided by integrated public-private planning”

She said three priorities next : ***strong research ; a digital knowledge management system capable of translating data into policy-relevant insights, and useful capacity building*** particularly for young researchers through strengthened Indo-German and other international collaborations.

Innovation & Sustainability

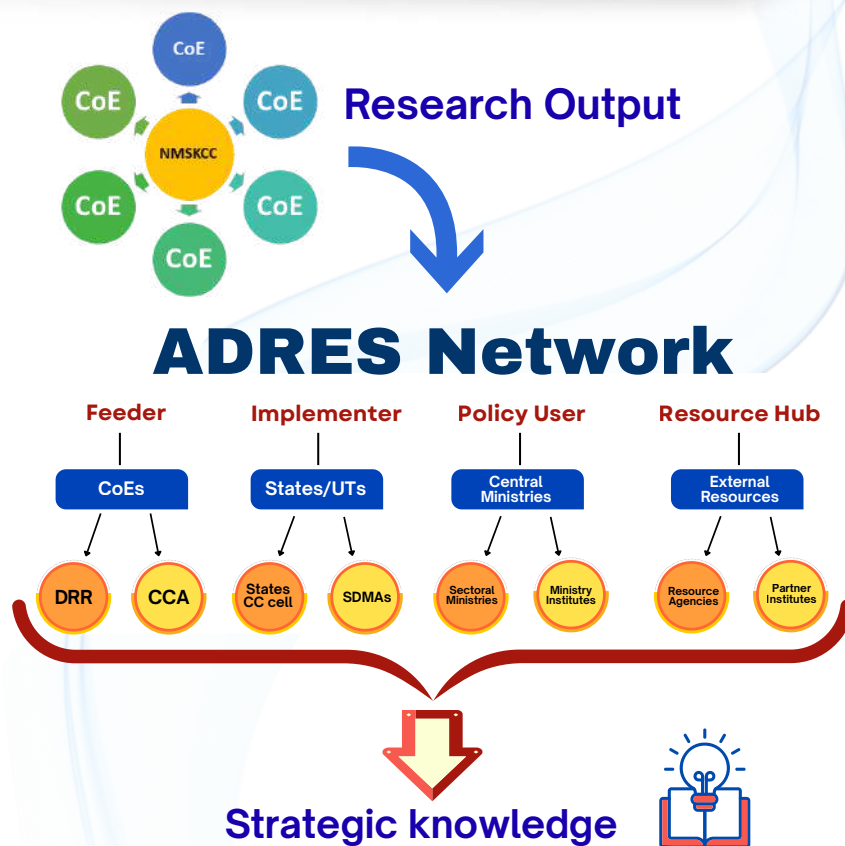
The Amphibious Bicycle – On Water and Land

Mohammad Saidullah, a self-taught innovator from Motihari district in Bihar, solved a common problem of crossing rivers and modified a conventional bicycle with foldable rectangular air floats and radial fan blades on the rear wheel spokes, enabling smooth movement on land and water with pedal power alone. The amphibious bicycle is light, inexpensive and requires no fuel. For rural communities it is an independent alternative to crowded ferries, saving time and transport costs. The innovation has been supported by the Micro Venture Innovation Fund of NIF with ₹33,750 for developing the prototype. The innovation also holds potential for amusement parks, removal of aquatic weeds and delivery of goods around water bodies. It is a remarkable example of need-driven, nature-friendly grassroots ingenuity.



National Mission on Strategic Knowledge for Climate Change (NMSKCC)

Climate Knowledge Forum: ADRES Network Portal



PURPOSE

- ✓ Plan, develop, and promote knowledge integration from multiple sources—research, practice, and policy.
- ✓ Facilitate knowledge sharing and collaboration through a dedicated network platform.
- ✓ Engage Centres of Excellence (CoEs), institutes, agencies, and domain experts within the network.
- ✓ Strengthen cooperation and information exchange among stakeholders working on climate and resilience

BENEFITS

- ✓ Centralized Platform for Knowledge sharing
- ✓ Publications - White Papers, Policy Briefs, Reports, Books
- ✓ Discussion Forums
Resource Library

Hosted by ICARS, IIT Roorkee

Together for a Resilient India



ADRES Network Launch

India's Strategic Knowledge Framework on Climate Change - the ADRES Network, developed under the National Mission on Strategic Knowledge for Climate Change (NMSKCC), Department of Science and Technology (DST), Government of India was formally launched during the inaugural session of RESSUMMIT 2026: Climate Knowledge Forum held on 16 March 2026 at the Indian Institute of Technology Roorkee Greater Noida Campus.

The launch brought together representatives from the Ministry of Environment, Forest and Climate Change (MoEFCC), National Disaster Management Authority (NDMA), DST, and several leading national organizations working in the areas of climate change, disaster risk reduction, sustainability, and resilience.

The [ADRES Network Portal](https://adresnetwork.iitr.ac.in/), accessible at <https://adresnetwork.iitr.ac.in/>, has been envisioned as a national platform to connect research institutions, policy makers, practitioners, and knowledge partners working towards climate-resilient and sustainable development.

Strategic Background

The National Mission on Strategic Knowledge for Climate Change (**NMSKCC**), one of the eight missions under the National Action Plan on Climate Change (**NAPCC**), focuses on converting climate-related research into strategic knowledge that can support informed decision-making and policy planning. In this context, the ADRES Network has been developed as a collaborative knowledge platform that can strengthen coordination between science, policy, and practice.

The initiative also resonates with the recommendations of the third session of the National Platform for Disaster Risk Reduction (**NPDRR-III**), which emphasized the need for stronger multi-stakeholder knowledge-sharing mechanisms to support evidence-based governance and resilience planning. In addition, the network aligns with the Hon'ble Prime Minister's Ten-Point Agenda for Disaster Risk Reduction, particularly **Agenda - 6** the call for building a stronger network of universities and knowledge institutions working on resilience and disaster preparedness.

ADRES Framework

At its core, the ADRES Network is designed to bring together knowledge generation, research integration, innovation, policy engagement, and dissemination within a single collaborative framework. The platform aims to bridge the gap between research outputs and practical decision-making by enabling continuous interaction between academic institutions, government agencies, and resource organizations.

The portal integrates contributions from:

Feeders: Centres of Excellence (CoEs) working in Climate Change and Disaster Management

Implementers: State Climate Change Cells and State Disaster Management Authorities

Policy Users: Key central sectoral ministries

Resource Agencies: National resource agencies such as NITI Aayog and National Disaster Management Authority

Through this collaborative ecosystem, the ADRES Network will support to develop **White Papers, Policy Briefs, Technical Reports, and knowledge publications**. The platform will also facilitate brainstorming sessions, stakeholder consultations, expert dialogues, and inter-ministerial interactions to encourage informed and coordinated climate action.

Dissemination of knowledge outputs will take place through the portal, newsletters, thematic discussions, and policy engagement activities. By connecting institutions, experts, and policymakers on a common platform, the ADRES Network is expected to contribute significantly towards strengthening **strategic climate knowledge** and evidence-based resilience planning in India.



Adapt DMIR

INDIA'S NATIONAL
ADAPTATION PLAN (NAP)
FOR DISASTER MANAGEMENT &
INFRASTRUCTURE RESILIENCE SECTOR

ICARS as National Anchoring Institution OF MoEFCC for assistance in developing and implementing the National Adaptation Planning & Implementation (DM&RI Sector)

Role of Adapt DMIR

- Assistance in developing National Adaptation Plan of India (sectoral chapter for Disaster Management & Resilient Infrastructure).
- Facilitate knowledge integration for adaptation planning towards policy making.
- Support implementation of climate adaptation strategies.

Key Focus Areas

Strengthening
adaptation
planning, &
Governance

Catalyzing
private sector
engagement in
adaptation

Producing
evidence for
designing
adaptation
Solutions

Major Activities



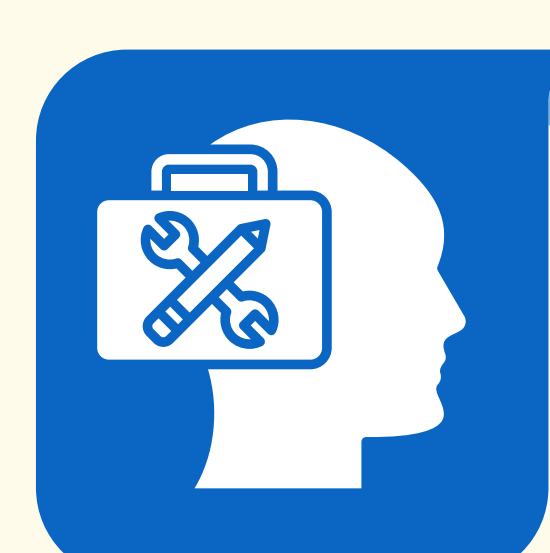
National Webinar Series



Research & policy
publications



White paper development



Development of training
toolkits



Organizing awareness
programme & outreach



Workshop & Capacity
building programme



Compendium of climate
adaptation case studies

Adapt DMIR

India's National Adaptation Plan (NAP) for the Disaster Management & Infrastructure Resilience Sector

Adapt DMIR is the sectoral chapter of India's National Adaptation Plan (NAP) focused on the Disaster Management and Resilient Infrastructure (DM&RI) sector as titled "Developing a comprehensive climate adaptation strategy and a detailed implementation roadmap on disaster management and infrastructure resilience for India's national adaptation plan". As climate change drives more frequent and severe hazards - floods, cyclones, heatwaves, landslides - the resilience of India's infrastructure and disaster management systems becomes central to safeguarding lives, livelihoods and long-term development gains. Adapt DMIR provides a structured framework to integrate climate adaptation into how India plans, builds and manages its critical infrastructure and emergency response systems.

ICARS at IIT Roorkee, Greater Noida Campus, serves as the National Anchoring Institution under the Ministry of Environment, Forest and Climate Change (MoEFCC) for the DM&RI sector. It is supported by the UNDP, India. In this role, ICARS supports the development and implementation of the sectoral NAP - coordinating across ministries, research institutions and partners to translate national adaptation priorities into actionable, evidence-based interventions on the ground.

Through Adapt DMIR, the initiative facilitates knowledge integration between researchers, policymakers and practitioners; builds technical capacity within governments and institutions; and supports the design and rollout of climate adaptation strategies tailored to the disaster and infrastructure sector.

Role of Adapt DMIR

- Assist in developing the National Adaptation Plan of India - sectoral chapter for Disaster Management & Resilient Infrastructure.
- Facilitate knowledge integration linking adaptation planning to evidence-based policy making.
- Support implementation of climate adaptation strategies across central and state agencies.

Key Focus Areas

Strengthen Adaptation Planning & Governance	Catalyze Private Sector Engagement in Adaptation	Produce evidence For Designing Adaptation Solutions
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Major Activities

National Webinar Series	<i>Sector-wide dialogues on adaptation priorities and best practices.</i>
Research & Policy Publications	<i>Studies and briefs informing national and state-level decision-making.</i>
White Paper Development	<i>Strategic frameworks on climate-resilient infrastructure and disaster management.</i>
Training Toolkits	<i>Practical resources for government officials and sectoral practitioners.</i>
Awareness & Outreach	<i>Programmes engaging communities, industry and civil society.</i>
Capacity Building Workshops	<i>Skill development for institutions implementing adaptation actions.</i>
Compendium of Case Studies	<i>Documented climate adaptation interventions from across India.</i>

K002	Summit Talk : From Plans to Results - Strengthening Knowledge, Implementation and Monitoring for Adaptation and Resilience 11.15 - 12.30 Main Hall
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Session Partners: GIZ, IIT Delhi & ICARS-IIT Roorkee

Guests:

- **Dr. Nisha Mendiratta, HOD-CEST Division, DST-Government of India**
- **Shri Kirtiman Awasthi, Senior Advisor and Project Head, CAFRI-GIZ India**
- **Dr. Upasana Sharma, Associate Professor, IIT Delhi**
- **Ms. Kadambri Annatharam, Director - Climate and Livelihoods**

Athena Infonomics

- **Mr. Girdhari Bora, Chief Innovation Officer, Tattwa Foundation**

Background: The session addressed the challenge of translating priorities under the National Action Plan on Climate Change and State Action Plans on Climate Change into tangible resilience outcomes. While policy frameworks exist, implementation gaps remain in governance coordination, access to climate risk knowledge, integration with development planning, and outcome-based monitoring. Strengthening these systems is critical for advancing India's commitments under the Paris Agreement and the Sustainable Development Goals. By focusing on governance, knowledge ecosystems, and monitoring frameworks, the session supported resilient development pathways aligned with Viksit Bharat @ 2047 and the Summit's objective of accelerating actionable and measurable climate resilience outcomes.

Key Discussion Points

- Monitoring and Evaluation (M&E) frameworks are needed for tracking the effectiveness of both ongoing and new climate actions without them, policy remains aspirational rather than accountable.
- Digitisation through MIS platforms and dashboards significantly improves transparency, inter-departmental coordination, and real-time visibility of climate action across governance levels.
- Effective climate monitoring demands clear, harmonised indicators, standardised definitions, and unambiguous institutional ownership of data reporting, gaps in any of these dimensions undermine the entire system.
- Evidence synthesis and structured research networks are important to converting fragmented, siloed climate knowledge into coherent, policy- ready insights that decision-makers can act upon.

- Continuous feedback loops and timely course corrections are not optional add-ons, they are system necessities for long-duration climate plans such as NAPCC and SAPCCs to remain relevant and effective.



Innovations and Good Practices

- Digitised climate M&E systems and interactive dashboards at both state and national levels are enabling real-time data exploration, transparent progress reporting, and faster identification of implementation gaps.
- Hub-and-Spoke Institutional Networks, linking national research centres with regional hubs and local partners, are emerging as an effective model for structured adaptation knowledge exchange across geographies and governance levels.
- Reframing M&E frameworks as dynamic learning tools rather than static compliance instruments enables continuous course correction, early identification of policy failures, and iterative improvement of climate action plans.

Policy Insights

- Climate governance must be anchored in harmonised indicators and clearly assigned institutional responsibilities, without these, monitoring across national, state, and departmental levels remains inconsistent and unreliable.
- Digital data systems and evidence synthesis must be embedded within climate policy design from the start, ensuring that plans are built for measurable outcomes rather than retrofitted with reporting mechanisms.
- Strengthening multi-level coordination, from national frameworks down to local implementation, alongside sustained capacity building, is the basic need for translating adaptation and mitigation commitments into ground-level results.



Way Forward

- A national standardised climate M&E architecture with harmonised indicators, common definitions, and designated institutional custodians at each level must be developed and notified to provide a credible, comparable baseline for tracking India's adaptation and mitigation progress.

- Digital MIS platforms and dashboards should be scaled systematically across all states. With interoperability built in from the start, so that data generated at the district and block level can feed seamlessly into state and national reporting frameworks.
- Institutions such as ICARS-IIT Roorkee and the IIT Delhi - Centre of Excellence on Climate Information should be formally positioned as knowledge integration hubs, synthesising research, coordinating evidence, and providing decision-ready inputs to NAPCC and SAPCC review processes on a rolling basis.
- Capacity building for M&E must move beyond technical training to build institutional culture where data collection, analysis, and feedback are understood as core governance functions rather than donor-driven obligations.

K003	Top Dialogue: Innovative Finance for Adaptation & Resilience 12.30 - 13.30 Main Hall
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Session Partners: UNDP, FCDO, NITI Aayog, ICARS-IIT Roorkee

Guests:

- **Dr. Shalini Dhyani, Principal Scientist, CSIR-NEERI**
- **Dr. Unnikrishnan D. Nayar, Senior Climate Change Specialist, Asian Development Bank**
- **Ms. Somya Bhatt, Project Specialist, UNDP India**
- **Mr. Bhaskar Padigala, Climate Adviser, FCDO - British High Commission-India**
- **Dr. Ananya Rao, Consultant, UNDP-NITI Aayog**

Background: India faces a significant financing gap in implementing large-scale climate adaptation measures to safeguard livelihoods, infrastructure, and ecosystems. Public finance remains the primary driver of adaptation, but it is insufficient, highlighting the need to mobilize private capital and alternative financing pathways. This session will explore pathways to unlock private sector investment through blended finance mechanisms, risk-sharing instruments, climate-resilient infrastructure bonds, and improved climate risk disclosure frameworks. It will also examine the role of public institutions, development finance, and policy incentives in de-risking adaptation investments and creating viable markets for resilience solutions. The session aims to identify actionable strategies to scale adaptation finance, strengthen resilience at national and sub-national levels, and support India's long-term climate development goals toward a resilient and sustainable future.

Key Discussion Points

- India stands at a important juncture where the adaptation gap is no longer an highlight in UN reports but a lived reality with over 80% of India's population residing in districts highly vulnerable to climate and disaster risks, and the economy already facing potential losses of \$30 billion annually from extreme heat and shifting monsoons, climate adaptation must be repositioned from an environmental obligation to a core economic and developmental necessity embedded in national planning frameworks.
- Adaptation finance continues to flow through fragmented, departmental silos : water, agriculture, health, and disaster management are planned and financed independently. Without a unified programmatic framework that looks at connected systems, unless a coordinating mechanism rings the bell and drives cross-departmental convergence, individual sector plans will remain low-impact and isolated, failing to deliver the scale of transformation required.



measurement gap directly undermines investor confidence, private sector engagement, and policy priority setting at both national and state and local levels.

- Community-level realities and capacities are vastly uneven across India's diverse geographies, experiences from tribal cotton farmers in Tamil Nadu facing crop failure due to misaligned market incentives, climate-adaptive tea cultivators in Assam investing in resilient varieties, and flooding-affected communities in Kerala and Mumbai all demonstrate that adaptation investments cannot follow a one-size-fits-all model. They must be highly contextualised, locally owned, and informed by on-the-ground evidence rather than imposed through external or top-down mechanisms.
- Institutionalisation of climate resilience across government departments remains weak, most state and national departments continue to view climate change through narrow sector mandates and short annual budget cycles, preventing the cross-departmental collaboration needed for full resilience. heatwaves, for example, require simultaneous action from disaster management, health, finance, water, and electricity departments, yet these departments rarely plan together, resulting in fragmented and inadequate responses.



Innovations and Good Practices

- Maharashtra's Climate Finance Facility and Framework, a dynamic, state-level climate finance taxonomy being developed with UNDP and UK support, that does not wait for the national taxonomy to be finalised. It enables Maharashtra to begin aligning its state budget with both mitigation and adaptation priorities, building institutional capacity for climate-responsive fiscal planning at the state and local level while remaining adaptable to emerging national frameworks.
- Tamil Nadu's Heat Resilience Centre - a cross-departmental institutional mechanism being established to develop a State Heat Mission. Bringing together departments of

health, water, finance, disaster management, and electricity through structured working groups, this model embeds heat as a system-wide risk into departmental budgets and planning cycles, moving beyond siloed responses toward an integrated, multi-year roadmap for heat resilience.

- Africa Risk Capacity - inspired Sovereign Risk Transfer Mechanism being explored for India, drawing on over a decade of successful implementation in Africa where countries received rapid payouts (within a week) following Hurricane Beryl at estimated cost of \$206 million. UNDP and partners are working with NDMA and the Department of Financial Services – Ministry of Finance, GoI to design a sovereign-level risk insurance and transfer mechanism for India, using government premium subsidies to make the model viable at scale.

Policy Insights

- A clear national climate finance taxonomy must be released urgently, without it, private investors lack the policy signal and definitional framework to confidently deploy capital into adaptation. The taxonomy is the basic infrastructure that will unlock private sector participation, enable project classification, and create a coherent ecosystem for blended finance, resilience-linked bonds, and parametric insurance instruments to function at scale.
- The National Adaptation Plan (NAP), once launched, must serve as a bankable project pipeline platform, not just a planning document. With a clearly structured portfolio of sector-specific, practically designed adaptation projects that bring together public and private investors, provide first-loss guarantees for high-risk interventions, and include transparent monitoring and evaluation frameworks that demonstrate measurable adaptation outcomes to justify continued investment.
- SEBI's Business Responsibility and Sustainability Reporting (BRSR) framework mandating climate risk disclosure for 1,000 companies, and the RBI climate disclosure framework, represent important policy advances that must be strengthened and scaled, simultaneously, state action plans need to be elevated from line-department documents to whole-of-government instruments with fiscal backing, inter-departmental mandates, and long-term investment roadmaps spanning 5, 10, and 20-year horizons rather than annual budget cycles.

Way Forward

- Shift from project-based to programme-based adaptation investment departments ; and ministries must move beyond standalone projects that end when tenure changes - toward institutionalised, multi-year adaptation programmes embedded in departmental mandates and state budgets. Bihar's Vision 2050 and Maharashtra's Climate Finance Framework offer easy to repeat models where long-term climate commitments are translated into annual fiscal allocations with measurable milestones.
- Build a strong, bankable pipeline of adaptation projects across sectors. Covering ecosystems, agriculture, urban infrastructure, and community resilience, designed to

attract both public and private capital through clear revenue streams, first-loss guarantee mechanisms, blended finance structures, and performance-linked instruments. **The 116 high-potential restoration districts identified among India's 579 districts offer an immediate starting point for nature-based adaptation investment at scale.**

- Strengthen state and local financial and technical capacity to absorb and deploy climate finance effectively, the example of Pune that raised ₹200 crore through municipal bonds but left the entire amount unspent in a bank account illustrates the important gap between capital mobilisation and capital utilisation. cities, states, and local institutions need parallel investment in human capacity, financial literacy, and governance systems to ensure that funds translate into on-the-ground resilience outcomes.
- Accelerate the design and piloting of pre-disaster and parametric financing mechanisms at the sovereign and community levels. Moving from post-disaster recovery financing to anticipatory action models, including sovereign risk transfer insurance, parametric insurance for farmers and vulnerable communities, guarantee facilities for high-risk adaptation investments, and rapid disbursement mechanisms that ensure communities receive support before or immediately when a disaster strikes, reducing the human cost of delayed institutional response.

Innovative Policy Framework

Maharashtra's Climate Finance Facility and Framework : Climate Finance Access and Mobilisation Strategy (CFAMS)

As Maharashtra sets a target on a USD 1 trillion economy by 2027-28, the state realised that public funding alone will not be enough to meet the estimated ₹3 lakh crore needed for climate action between 2024-2030. The CFAMS, developed by the State Climate Action Cell, WRI India and MITRA is a structured framework for identification, access, mobilisation and allocation of climate finance across sectors, directly aligned with SAPCC 2.0 and Viksit Maharashtra 2047. A dedicated Climate Finance Dashboard will track cross-departmental climate expenditure and draw in private capital, while a proposed Climate Finance Facilitation Desk will make operations more efficient. Through blended finance and risk-sharing tools, CFAMS directs investment into the most climate vulnerable regions and sectors, making climate action not just an environmental duty but Maharashtra's highest strategic economic priority.

T004

Thematic : Wetland based NbS. Practice to Policy - For Resilience, Environment and People
14.15 - 15.30 | Srijan

Session Partners: HCL-F, GEAG, ICARS-IIT Roorkee

Panellists:

- **Prof. Anil K. Gupta, WRDM-IIT Roorkee, PI-ICARS-IIT Roorkee**
- **Dr. Shiraj Wajih, President, GEAG**
- **Dr. Vandana Gupta, Consultant, GEAG**
- **Mr. Dhruv Verma, Senior Technical Officer, Wetlands International**
- **Mr. Arijit Das, Director – Resource Mobilization & Partnership, SEEDS**
- **Ms. Nivedita Mani, Researcher, GEAG**

Background: This session addresses the increasing climate vulnerability of wetlands and the communities dependent on them, along with the limited integration of wetland-based Nature-based Solutions (NbS) into development and climate policies. Wetlands face pressures from land-use change, pollution, encroachment, unsustainable agriculture, and climate-induced hazards such as floods and droughts. Although many community-led restoration initiatives exist, these remain localized and rarely influence policy or scale through institutional mechanisms. The session aims to bridge the gap between grassroots practices, scientific evidence, and policy frameworks. Strengthening wetland-based NbS supports global commitments such as the Paris Agreement and Ramsar Convention, advances SDGs, and aligns with Vision 2047 by promoting climate-resilient, sustainable development.

Key Discussion Points

- India's wetlands are vanishing at an alarming rate, the 2024 Atlas of Wetlands reveals India has approximately 7.5 lakh wetlands, yet over 50% have been lost or degraded in the last 50 years. In Gautam Buddha Nagar alone, over 40% of ponds are receiving untreated wastewater and are no longer functional as ecosystem assets. While urban expansion, encroachment, and misguided beautification projects continue to fill wetlands with garbage and convert them into parks, only to see catastrophic flooding return in heavy rainfall seasons.



- Wetlands are multi-functional climate infrastructure, not merely conservation patches, storing 30 to 40% of global terrestrial carbon, regulating hydrology through flood buffering and groundwater recharge, supporting biodiversity and livelihoods, and acting as natural sponges against extreme weather events. The dominant narrative that wetlands merely need to be conserved must shift toward recognising them as active, decentralised climate resilience infrastructure whose wise use must be integrated into urban planning, district disaster management plans, and national adaptation frameworks.
- Not all wetlands are equal, blanket nature-based solution prescriptions risk becoming greenwashing. Small wetlands, large reservoir wetlands, Himalayan wetlands, flood plain wetlands, and coastal mangrove systems each have distinct inherent characteristics, perform different ecological functions, and require context-specific, location-sensitive management. Policymakers and planners must move beyond one-size-fits-all NbS mandates toward functionally grounded, landscape-contextual wetland management.
- The governance and institutional landscape for wetland management remains



fragmented and weak, boundary disputes, encroachment, unclear jurisdictional mandates across district and sub-district levels, and the absence of cross-sector coordination between Central Public Works Department, District Development Authority, disaster management authorities, and urban local bodies mean that even well-intentioned

wetland conservation policies fail at implementation. ***India's 99 Ramsar sites tripled in the last six to seven years, are largely not in good functional condition, raising serious questions about whether designation translates into effective management.***

- ***The inter-complementarity between wetland wise use, livelihood opportunities, and climate co-benefits forms a important policy triangle*** that is not yet adequately reflected in either national schemes or state action plans. When wetlands are used unsustainably, ecological degradation undermines the very livelihoods that depend on them. Conversely, when wetlands are restored and managed wisely, they simultaneously deliver climate resilience, biodiversity, water security, and community economic benefits, making them among the highest-return investments available to adaptation planners.

Innovations and Good Practices

- Integrated wetland restoration as decentralised climate infrastructure in Gautam Buddha Nagar - four degraded urban ponds (Police Lines, Makkoda, Ramgarh, Dayanathpur) were restored through ***an integrated package combining desiltation, drainage reconnection, catchment repair, constructed wetlands for wastewater treatment, native vegetation replanting for biodiversity, and community***

stewardship in planning, execution, and post-maintenance. Results were measurable and important : cumulative water storage restored to 23,000 cubic metres, groundwater recharge potential of 1,06,000 cubic metres, and carbon emissions reduced from 25 tonnes CO₂ equivalent per hectare per year to 8 tonnes, translating to 2,700 tonnes of mitigation potential at district scale, demonstrating that small, integrated wetland restoration delivers outsized climate, ecological, and community dividends.

- Wetlands International - South Asia successfully piloted the integration of wetland-based nature-based solutions into District Disaster Management Plans including in Odisha where a proactive engagement resulted in integration of NbS in the District DMP. This model of embedding wetland functions into institutional disaster planning frameworks offers a easy to repeat template for including wetland conservation into governance systems beyond the environment sector alone.
- Current National Wetland inventories provided by the Space Application Centre, Ahmedabad capture area and location data but do not classify wetlands by functional capacity. Emerging efforts to develop performance-oriented inventories that identify which wetlands contribute to water security, flood buffering, biodiversity enhancement, or carbon storage represent a important innovation in translating ecological knowledge into decision-relevant tools for urban planners, district administrators, and disaster management authorities.

Policy Insights

- Wetlands must be formally recognised and coded as climate infrastructure in national and urban planning frameworks, once recognised as infrastructure rather than conservation patches, wetland restoration becomes eligible for adaptation funds, climate vulnerability project budgets, and urban development schemes. **A policy brief prepared by GEAG released at the session - Blue-Green Assets including Wetland-Based Nature-Based Solutions for India's 2030 Climate and Disaster Goals** - provides the architecture for this integration, identifying specific windows in existing government schemes and programmes through which wetland restoration can be financed without requiring entirely new funding streams.
- Cross-sector coordination mechanisms must be institutionalised for wetland governance - effective wetland management requires active collaboration across environment, urban planning, water resources, disaster management, and livelihood departments. Current siloed approach where wetlands fall primarily under MoEFCC jurisdiction fails to use their full cross-sector value. Integrating wetland management into urban master plans, district development plans, and state action plans with clear inter-departmental mandates is essential for moving from policy recognition to on-ground outcomes.
- Customisable, able to grow frameworks for wetland-based NbS must be developed at city, block, and district levels, a one-size-fits-all national framework is insufficient given the diversity of wetland types, geographic contexts, and local governance capacities

across India. Building on the policy brief released at this session, manuals and frameworks need to be co-developed with government departments and community partners, piloted in diverse contexts, and made adaptable enough to function across urban, peri-urban, and rural settings while drawing on lessons from partners including Wetland International and GEAG's 25-plus wetland rejuvenation projects in Uttar Pradesh.

Way Forward

- Scale integrated wetland restoration from isolated projects to district-level and landscape-level programmes, moving beyond individual pond rejuvenation to hydrological connectivity-based restoration across entire urban and rural watersheds.
- Develop and mandate functional wetland inventories as the basis for all urban and district planning decisions, upgrading current area-based wetland databases to performance-classified, action-oriented inventories that tell planners which wetlands perform which functions.
- Establish hybrid grey-green-blue infrastructure planning as the standard for urban flood and climate resilience, replacing the current default of hard engineering flood walls and drainage systems with integrated approaches that combine constructed and natural wetlands, restored flood plains, drainage reconnection, and community-managed green buffers.
- Creating revenue streams from ecosystem services for local communities, and establishing monitoring and evaluation mechanisms that track ecological health and climate benefit delivery over multi-year timescales must be ensured. Wetland maintenance should be a permanent line item in district and municipal budgets rather than a time-bound project activity.

Innovative Case Study : GEAG

Citizen Voices for Wetland Conservation : The Gautam Buddh Nagar Model

Uttar Pradesh's 18,000+ wetlands, including 10 Ramsar Sites, were increasingly under threat from encroachment, pollution and climate change. Through participatory dialogues with local communities, District Wetland Committees and youth groups across four Ramsar sites, GEAG developed site-specific and state-level CEPA strategies : translating grassroots knowledge into structured communication, education and awareness frameworks. This was complemented by restoration of four degraded urban ponds in Gautam Buddha Nagar (Police Lines, Makkoda, Ramgarh and Dayanathpur) as decentralised climate infrastructure through desiltation, reconnection of drainage, constructed wetlands for waste water treatment, native replanting and community stewardship. Collectively, these initiatives provide a replicable community-led model of citizen participation and wetland governance, contributing directly to the UP Wetland Management Policy 2019.

T005

**Thematic : Risk to Resilience -Strengthening States' Capacities for Climate Modelling & Resource Identification towards Vision 2047
14.15 - 15.30 | Sankalp**

Session Partners: UNDP, FCDO, NITI Aayog

Panellists:

- ***Md. N.G. Siddiqui, Joint Secretary, Disaster Management Department
Govt. of Bihar***
- ***Dr. Sarat Kumar Das, State Project Officer, Disaster Management,
Govt. of Tripura***
- ***Mr. Shashvat Singh, Senior Fellow, CDEC - India Foundation***
- ***Mr. Anindya Bhattacharya, Executive Director, Celestial Earth***
- ***Mr. Chindu Chandran, Manager, Micro-Save Consulting***
- ***Mr. Pranav Garimella, Assistant Manager, KPMG***

Background: Achieving India's long-term climate resilience goals requires strengthening state capacities to assess risks, develop data informed strategies on climate adaptation, and to be aware of mobilizing resources effectively. This session will focus on how to advance state-level adaptation modelling to identify region- and district-specific climate vulnerabilities, develop localized risk profiles, and assess technical and institutional capacity gaps that constrain effective adaptation implementation. It will explore mechanisms for institutional convergence by breaking departmental silos and fostering coordinated action across sectors such as water, agriculture, finance, and disaster risk management. The discussion will also highlight the importance of capacity building through partnerships with research institutions, enabling the scaling of traditional knowledge and locally tested innovations into state level strategies.

Key Discussion Points

- Climate resilience must be mainstreamed across all sectors of governance and not remain confined to environment departments. Climate resilience is not yet a core policy issue in everyday governance despite being a fundamental development need.
- The experiences of Bihar and Tripura demonstrate that when early warning systems, community preparedness, climate-informed planning, and institutional coordination are brought together into unified platforms rather than managed as separate departmental mandates, the resulting resilience architecture is significantly more strong, responsive, and cost-effective than siloed sector interventions.



- The important data challenge is not availability but usability, granularity, and integration, the biggest data gap in climate resilience planning is not the quantity or even the quality of data but the failure to convert available datasets into practical, real-world planning tools at the Panchayat level.

- State Action Plans on Climate Change (SAPCCs) face system

implementation bottlenecks including limited technical capacity, fragmented departmental coordination, and inadequate financing frameworks, Bihar's experience highlighted that resilience is built through foresight, collaboration, and preparedness rather than post-disaster response. While Tripura's case demonstrated that training and capacity building of officials combined with documentary evidence of best practices, are prerequisites for useful climate modelling and resource identification at state level.

- Community participation must be structurally embedded in resilience planning rather than treated as a peripheral consultation exercise, bio-shield initiatives, local early warning networks, and community-based adaptation approaches.



Innovations and Good Practices

- Tripura's unified early warning platform, integrating multiple sector-specific early warning systems into a single, coordinated platform represents an important institutional innovation that reduces duplication, improves response time, and enables cross-hazard monitoring.
- Bihar's AI enabled Decision Support System (DSS) portal for real-time climate risk monitoring represents a technology-forward approach to evidence-based governance. This system enables administrators and planners to access granular, live risk information, significantly improving the speed and quality of decision-making in pre-disaster preparedness, during-event response, and post-disaster recovery phases at state and district levels.
- Community-based resilience approaches including local participation and bio-shield initiatives, the integration of community stewardship shows that community-based solutions not only deliver ecological and protective outcomes but also build local ownership, reduce long-term maintenance costs, and strengthen the social capital that is important to recovery after extreme events.

Policy Insights

- Adopt whole-of-government approaches that formally integrate climate resilience into all sector policies, health, agriculture, infrastructure, water, and finance departments. Each must carry explicit climate resilience mandates within their planning and budgeting cycles.
- Develop full institutional frameworks for climate finance that go beyond public expenditure, it is neither reasonable nor sufficient to expect that all domestic adaptation finance needs will be met through public budgets. States must build the institutional architecture and must clearly understand their own financial baseline and gaps before approaching external funding sources.
- Strengthen decentralised climate planning using granular, integrated, and continuously updated data at district and panchayat levels, the current disconnect between state-level climate data systems and local planning processes must be bridged through dedicated data translation infrastructure.

Way Forward

- Transform State Action Plans on Climate Change from policy documents into operational governance instruments - SAPCCs must be converted into time-bound, well-funded, inter-departmentally owned action frameworks with clear implementation responsibilities, monitoring milestones, and accountability mechanisms at state, district, and panchayat levels.
- Build structured capacity development programmes for state and district officials on climate modelling, risk assessment, and finance, the human capacity gap identified across states is as important as the financial gap.
- Establish data translation infrastructure that converts climate information into panchayat-level planning inputs, investing in systems, tools, and human intermediaries that bridge the gap between complex climate datasets and the practical planning needs of gram panchayats, urban local bodies, and district administrations.
- Accelerate private and multilateral climate finance mobilisation through state-level institutional readiness - states must develop the institutional capacity to design and present bankable adaptation project pipelines to private investors and multilateral development banks.

T006

Thematic: Structuring Climate-Resilient Solutions -Mobilizing Commercial Finance for Adaptation 14.15 - 15.30 | Sanrakshan

Session Partners: GIZ

Panellists:

- *Mr. Hauke Waszkewits, Head of Component for Climate Finance-CAFRI, GIZ India*
- *Mr. Vikash Mishra, Business Director, Evergreen Innovation Platform*
- *Mr. Syed Farhan, associate Director, PwC*
- *Dr. Pushp Bajaj, Program Lead, Climate Resilience, CEEW*
- *Mr. Partha Ghosh, Program Lead, Social Alpha*

Background: Given the scale of future requirements for climate adaptation, public finance alone will be insufficient. The private sector must therefore evolve from a supplementary contributor to a structural partner in advancing resilience and supporting India's Viksit Bharat vision. Private sector involvement ensures that adaptation actions are economically viable, scalable, responsive to market needs and revenue generating. Engaging private actors across all phases of planning, implementation, and monitoring of the adaptation strategies will enhance accountability, foster innovation, and strengthen the overall impact of implementation actions.

Key Discussion Points

- Public funding alone is structurally insufficient to meet the expanding scope of climate adaptation needs, the scale, diversity, and urgency of adaptation requirements across climate-sensitive sectors in India. The private sector must therefore transition from being an occasional or supplementary contributor to a system, co-equal partner in the planning, execution, and oversight of adaptation solutions.
- Climate adaptation is inherently location-specific and complex, making implementation, not policy design - the defining challenge. While adaptation frameworks and plans exist across national and state levels, translating them into real,



community-level actions that address localised vulnerabilities requires sector-specific innovation, tailored solutions, and on-the-ground execution capacity.

- Translating climate risks into financial terms is the need of hour for unlocking private investment, investors and businesses. They do not respond to ecological or humanitarian framing alone, climate risks must be said in the language of financial exposure, asset vulnerability, revenue disruption, and liability to make adaptation projects legible and attractive to commercial capital.
- Private sector engagement in adaptation requires a structured ecosystem of incentives, regulations, clear terminology, and coordinated frameworks, businesses will not invest in adaptation on the basis of goodwill alone.
- Partnerships among government, communities, businesses, and financial institutions are needed for scaling adaptation solutions, no single actor has the resources, reach, or expertise to address the full spectrum of climate adaptation needs.

Innovations and Good Practices

- Innovators such as Evergreen Innovation Platform are demonstrating that adaptation solutions which prove real returns in real market conditions through watershed restoration, climate-smart agriculture, or resilient infrastructure services can generate revenue streams that attract commercial capital and sustain themselves beyond project funding cycles.
- PwC's approach of embedding structured climate risk assessment into private sector decision-making processes covering physical risks, transition risks, and liability exposure, demonstrates that when businesses actively integrate climate risk into operations, supply chains, and investment decisions, adaptation shifts from a compliance exercise to a strategic business need.
- Social Alpha and the Evergreen Innovation Platform highlight the important role of dedicated incubation ecosystems in helping early-stage climate adaptation ventures overcome the valley of death between promising technology and market-ready solutions.

Policy Insights

- Making climate risk assessment a non-negotiable need for project approval ensures that resilience is built into the design and financing of infrastructure from the start rather than retrofitted at greater cost after climate impacts materialise.
- Design structured incentive and regulatory frameworks that make private sector adaptation investment commercially compelling - businesses require clear and predictable policy signals including tax incentives for adaptation investments.
- Promote public-private partnerships as the system vehicle for integrating resilience into large-scale infrastructure, agriculture, and urban development programmes. PPP frameworks designed explicitly for adaptation must go beyond cost-sharing

arrangements to include shared risk allocation, blended finance structures, community benefit obligations, and long-term performance monitoring.

Way Forward

- Build a nationally coordinated pipeline of bankable, private-sector-ready adaptation projects across climate-sensitive sectors, governments. Multilateral institutions must invest in preparing structured, market-ready adaptation project portfolios in agriculture, water, urban infrastructure, health, and ecosystems that come with clear revenue models, risk allocation frameworks, and impact metrics.
- Establish common terminology, standardised risk assessment frameworks, and shared metrics across government, finance, and private sector actors. The current absence of agreed definitions, measurement standards, and impact indicators for climate adaptation creates confusion, increases transaction costs, and prevents the cross-sector coordination needed for large-scale investment.
- Scale innovation ecosystems and incubation infrastructure for climate adaptation start-ups from urban centres to climate-vulnerable districts, the innovation pipeline for adaptation technologies must be deliberately built in and for the communities most exposed to climate risk. This requires expanding innovation hub networks to tier-2 and tier-3 cities, establishing challenge funds for adaptation entrepreneurs.
- Develop sector-specific adaptation investment roadmaps that align government priorities with private sector business models. Each major climate-sensitive sector requires its own investment pathway document that maps climate risks to business opportunities, identifies regulatory and market enablers, quantifies financial requirements, and proposes specific instruments.

T007

Thematic: Wetland based NbS - Practice to Policy- For Resilience, Environment and People
14.15 - 15.30 | Santulan

Session Partners: ADRA

Panellists:

- *Ms. Sarika Chakravarty, Director – Implementation, C40 Cities*
- *Shri Vivek Anand, Advisor Rural Development, GIZ*
- *Ms. Somabha Mohanty, National Lead - DRR, Gender, and Resilience, UN Women*
- *Shri Imran Majid, Director – Programs, ADRA India*
- *Ms. Eilia Jafar, Expert - Disaster Management*

Background: Anticipatory Action (AA) represents a shift from reactive disaster response to proactive, forecast-based decision-making. Despite improvements in early warning systems, a gap persists between warning, preparedness, and timely response. Forecast information generated at national and state levels often fails to translate into early action on the ground. Communities may not fully understand warnings or lack resources to act, while institutional systems remain response-oriented with unclear roles and delayed coordination. Financing is also typically mobilized after disasters rather than beforehand. By linking early warnings with predefined triggers, responsibilities, and pre-arranged funding, AA strengthens resilience, protects lives and livelihoods, and supports sustainable, climate-resilient development aligned with national and global resilience agendas.

Key Discussion Points

- Anticipatory action represents a fundamental shift in disaster management philosophy moving from reactive emergency response to proactive, forecast-based intervention that acts before disasters escalate into crises. By linking science-based early warning systems with predefined triggers, pre-arranged financing, and clearly assigned institutional responsibilities at national, state, and community levels, anticipatory action bridges the important gap between long-term disaster risk reduction and short-term emergency response.
- The increasing frequency, intensity, and unpredictability of disasters compounded by climate variability makes proactive risk management systems an urgent governance necessity rather than an aspirational goal. Lessons drawn from compounding crises such as COVID-19, and supply chain disruptions demonstrate that societies and institutions build resilience through lived experience, adaptive learning, and the cultivation of a culture of environmental responsibility that acknowledges risk before it materialises.

- Effective disaster management requires the thoughtful integration of modern technology and traditional community knowledge. While AI-enabled early warning systems, forecast models, and digital tools must compliment rather than replace the contextual, experiential knowledge that communities have accumulated over generations. Early warnings are only effective when they are trusted, acted upon, and embedded in community decision-making processes.
- Mega cities are increasingly on the frontline of climate impacts and require dedicated tools such as heat mapping, climate budgeting frameworks, and institutional mechanisms that can coordinate across municipal departments, national programmes, and community frontline workers to deliver targeted, equitable urban resilience.
- Women frontline workers including ASHAs, Anganwadi staff, and community health workers are the backbone of grassroots disaster response and resilience building yet remain structurally under-recognised, underpaid, and excluded from higher leadership and decision-making roles in climate and disaster governance. They have irreplaceable capabilities in community mobilisation, information dissemination, and care provision, yet this expertise is not converted into formal recognition, adequate financial compensation, or useful inclusion in the governance structures.



Innovations and Good Practices

- C40 Cities' evidence-based approach to urban heat resilience offers a able to grow model for Mega Cities which includes deployment of granular heat mapping tools enables municipal governments to spatially identify the most thermally vulnerable neighbourhoods, populations, and infrastructure assets, allowing targeted interventions such as cool roofs, urban greening.
- Development of structured, role-specific SOPs that equip Anganwadi workers, ASHAs, and other frontline community workers with clear protocols for pre-disaster preparedness, during-event response, and post-disaster recovery represents a practical innovation in last-mile resilience delivery by formalising the knowledge and responsibilities of community workers within institutional frameworks.
- ADRA's approach of building anticipatory action systems that layer real-time meteorological and hydrological forecasts with community-level risk intelligence and indigenous knowledge of local hazard patterns demonstrates that the most effective early warning architectures are hybrid systems.

Policy Insights

- Formulate standard Climate Action Plans with legal backing to ensure stronger and more accountable implementation of disaster and climate resilience strategies at city and state levels. Climate action plans that exist only as advisory documents without

legislative authority, dedicated budgets, or enforcement mechanisms consistently fail to drive the institutional behaviour change needed to build system-wide resilience.

- Establish dedicated and accessible funding mechanisms at local governance levels including panchayat-level disaster preparedness and anticipatory action allocations to enable timely, community-led pre-disaster interventions without dependence on post-disaster emergency releases.
- Build inclusive governance frameworks that structurally ensure the useful participation of women, frontline workers, and community representatives in climate and disaster decision-making bodies. The proven capacities of women frontline workers in crisis management must be converted into formal roles, recognised through adequate remuneration and career pathways, and elevated into the design and oversight of the resilience systems.

Way Forward

- Develop and make standard anticipatory action frameworks at national, state, and district levels with pre-defined targets, clear institutional responsibilities, and pre-arranged financing moving from ad hoc early warning responses to systematic anticipatory action.
- Scale urban climate action planning including heat mapping, climate budgeting, and frontline worker capacity building to all major Indian cities through a nationally coordinated programme that provides technical support, financing, and institutional frameworks. Building on the C40 Cities model and Bangalore's heat mapping experience, a national urban climate resilience programme should mandate Climate Action Plans with legal backing for cities above a defined population threshold.
- National and state disaster management authorities should establish structured processes for documenting, validating, and incorporating indigenous and local knowledge of hazard patterns into official risk assessments, early warning protocols, and anticipatory action triggers.
- Recognise and elevate women frontline workers as a core institutional pillar of disaster risk reduction, climate resilience. Governments and institutions must move beyond rhetorical acknowledgement to system reform by formalising the disaster management roles of ASHAs, Anganwadi workers, and community health volunteers in official DRR frameworks.

T008	Thematic: Rural Economy and Resilient Livelihoods. Biofuels & Sustainability 15.40 - 16.40 Srijan
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Session Partners: CSTEP

Panellists:

- *Dr. Pramod Kumbhar, President and CTO, Praj Industries*
- *Dr. Indu K. Murty, Sector Head- Climate, Environment and Sustainability, CSTEP*
- *Dr. Yash Joshi, Managing Partner, Aganvay Technologies*
- *Dr. Sanjukta Subudhi, Senior Fellow & Associate Director, Advanced Biofuels Division, TERI*
- *Dr. Vartika Singh, Senior Researcher, IFPRI*
- *Dr. Arun Kumar Rajora, Assistant Prof, Mody University of Science and Technology*
- *Ms. Ramya Natrajan, Research Scientist, CSTEP*
- *Ms. Rucha Phadke, Paani Foundation*
- *Ms. Kurinji Selvaraj, Research Analyst, CEEW*
- *Mr. Nitin Bajpai, Energy Vertical, NITI Aayog*

Background: With growing geopolitical uncertainties, the one solution that can truly and wholly be Atmanirbhar is biomass-based energy or fuels. But at what cost? What is the potential of biofuels to contribute to India's energy transition and rural economy/livelihoods without breaching sustainability thresholds?

Key Discussion Points

- Bioenergy holds important and largely untapped potential to support India's twin climate targets of 500 GW renewable energy capacity by 2030 and net-zero emissions by 2070. India's abundant biomass resources represent a strategically valuable feedstock base that is currently being squandered through open burning and inefficient utilisation, making the harnessing of this resource both an environmental need and an economic opportunity of considerable scale.
- Biomass supply chain gaps remain the most important operational bottleneck preventing bioenergy from scaling to its potential. Key deficiencies in storage infrastructure, moisture control systems, aggregation models, pricing mechanisms, transportation logistics, and fire safety management create system-wide inefficiencies that make feedstock supply unreliable and commercially unattractive. Without

resolving these supply chain fundamentals, even the most advanced biofuel technologies cannot achieve the feedstock security and cost stability needed to operate at commercial scale and compete effectively with fossil fuel alternatives in India's energy market.

- Advanced biofuel technologies including second-generation ethanol, biomass gasification, cellulosic ethanol production, and bio-methanol hold strong potential for significantly reducing carbon emissions while valorising agricultural waste. Yet, these technologies remain at varying stages of commercial readiness, requiring sustained research investment, pilot project scaling, strengthened academic-industry-government research collaborations.
- Current subsidy and pricing policies create unintended trade-offs that undermine the sustainability and scalability of bioenergy development. The absence of carbon market access for residue-based and second-generation bioenergy projects means that the important climate benefits these systems deliver are not financially rewarded, reducing their commercial viability and making it harder to attract the private investment needed for scale.
- Community engagement and inclusive value chain design are essential for bioenergy to deliver on its rural development and climate resilience promise. Sustainable bioenergy cannot be imposed top-down through technology alone - community participation in resource management decisions, feedstock aggregation, and the inclusion of women entrepreneurs in the bioenergy value chain are prerequisites for social acceptance to the rural communities whose land and labour underpin the entire system.



Innovations and Good Practices

- Converting loose agricultural residues into standardised, high-density solid fuel forms dramatically improves storability, reduces moisture content risks, lowers transportation costs, and makes biomass a more reliable and commercially tractable commodity. This technology represents one of the most practical near-term innovations for unlocking India's vast but currently diffuse biomass resource base.
- Praj Industries' advancements in converting agricultural residues into renewable fuels through biochemical and thermochemical conversion pathways demonstrate that India's enormous crop residue surplus can be transformed from an environmental liability into a valuable energy feedstock.
- Recognising that technology deployment alone cannot unlock bioenergy potential without corresponding human capacity at every node of the supply chain. Structured training initiatives that equip farmers with residue management knowledge,

aggregators with logistics and pricing skills, and women entrepreneurs with business development capabilities are creating an inclusive, knowledge-enabled rural bioenergy workforce.

Policy Insights

- Develop a national biomass management roadmap that defines feedstock priorities, maps resource constraints, projects long-term demand, and coordinates supply-side infrastructure investment. Such a roadmap must account for competing land, water, and food security considerations identified through energy and climate modelling ensuring that bioenergy scaling does not create unintended trade-offs with agricultural productivity, ecosystem integrity, or rural food systems.
- Current distortions in agricultural subsidies and feedstock pricing create perverse incentives that favour residue burning over utilisation, divert biomass toward less climate-beneficial uses, and undermine the commercial viability of advanced biofuel projects. Pricing reform must be accompanied by assured minimum support mechanisms for biomass suppliers that make feedstock aggregation economically attractive for farmers and aggregators.
- The important greenhouse gas emission reductions delivered by advanced biofuel systems are currently not monetised through carbon markets, representing a major missed opportunity to improve project economics and unlock commercial capital. Developing clear and accessible pathways for bioenergy projects in line with India's Carbon Credit Trading Scheme and international voluntary carbon markets will improve the investment case for advanced biofuels and accelerate the commercial deployment of technologies.

Way Forward

- Establishing a structured pathway that takes promising second-generation biofuel technologies through applied research, demonstration plant operation, techno-economic validation.
- Addressing the storage, aggregation, densification, logistics, and pricing gaps that currently prevent reliable feedstock supply requires a coordinated infrastructure investment programme that establishes biomass collection centres, densification depots, and cold storage facilities at district level.
- NITI Aayog's energy and climate modelling capabilities combined with IFPRI's research on land use, water resource, and food security trade-offs, should be deployed to develop state-specific bioenergy potential assessments that guide investment, policy, and infrastructure decisions.
- Ensuring that the benefits of bioenergy development flow equitably to the communities whose land and labour sustain the feedstock base. Building on Paani Foundation's community engagement model, bioenergy programmes should adopt a co-design approach that treats rural communities as partners and beneficiaries rather than suppliers.

T009	Thematic: Launch of Climate Knowledge Platform and Roundtable on Climate CoEs Network - Integrating Research Synthesis to Support Policy & Actions 15.40 - 16.40 Sankalp
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Curator: ICARS – IIT Roorkee

Panellists:

- *Prof. V. K. Sharma, Vice-Chairperson-Sikkim State Disaster Management Authority*
- *Prof. R. K. Bhandari, Former Director, CSIR-Central Building Research Institute*
- *Dr. R.J. Krupadam, Senior Principal Scientist, CoE, CSIR-National Environmental Engineering Research Institute (NEERI)*
- *Dr. P. Balasubramanian, Professor, CoE, Tamil Nadu Agricultural University (TNAU), Tamil Nadu*
- *Prof. Suneet Dwivedi, Professor, CoE, University of Allahabad*
- *Dr. Sonam Lotus, Regional Head, IMD Ladakh*
- *Dr. Vengadesan P., Post-Doctoral Researcher, CoE, IIT Madras*

Background: After official deployment of the portal, we can have roundtable on how can Centers of Excellence better synthesize and integrate their research outputs to generate actionable knowledge that directly informs national and state-level climate and disaster risk policies? What mechanisms or platforms are needed to enable effective collaboration, data sharing, and joint research among Climate CoEs to avoid duplication and strengthen collective impact? How can the Climate CoEs Network translate scientific research into practical tools, policy briefs, and decision-support systems that policymakers and practitioners can readily use?

Key Discussion Points

- Climate impact assessment of emissions, microclimate changes, and ecosystem vulnerability is basic to identifying at-risk regions and supporting evidence-based, region-specific planning. CSIR-NEERI's - Centre of Excellence demonstrates how systematic assessment of thermal power plant emissions on microclimate and biodiversity including tiger habitats can generate reliable scientific evidence that directly informs sustainable development decisions and region-specific climate adaptation planning.
- Climate-smart agricultural practices are important for building farm-level resilience against the compounding pressures of climate variability, water scarcity, and greenhouse gas emissions. TNAU's - Centre of Excellence highlights that small-scale, field-deployable innovations such as drip irrigation for water conservation, resilient

crop variety identification, soil carbon emission reduction techniques, and targeted capacity building programmes for farmers represent practical, accessible pathways to sustainable agriculture that can be adopted at scale.

- Current climate research in India is fragmented across domains, disciplines, and agencies in ways that limit its collective effectiveness and policy impact.. **ICARS is working to bridge this gap by creating a coordinated, policy-oriented research ecosystem that consolidates fragmented knowledge into practical intelligence, reduces duplication of effort, and ensures that research investments translate into real-world resilience outcomes.**
- Strengthening early warning systems and improving the reliability, accuracy, and usability of weather forecasts can significantly reduce disaster risks and impacts across climate-vulnerable communities. IMD Ladakh's experience demonstrates that sustained investment in forecasting infrastructure, combined with targeted farmer outreach, has measurably increased weather-awareness and forecast-utilisation among agricultural communities.
- Fragmented, inconsistently formatted, and poorly maintained data portals across research institutions undermine coordination, create duplication, and prevent stakeholders from extracting the insights they need. Standardisation of methodologies, output formats, updating protocols, and portal management practices across all Centres of Excellence is therefore a system-wide priority.



Innovations and Good Practices

- CSIR-NEERI's deployment of Geographic Information Systems and atmospheric modelling tools to map the spatial extent of thermal power plant emission impacts on the Vidarbha microclimate and surrounding ecosystems represents a easy to repeat methodology for translating complex environmental data into spatially, visually interpretable vulnerability maps that planners, regulators, and communities can directly use.
- TNAU's field-level deployment of micro-irrigation systems for water conservation combined with the systematic identification of crop varieties that perform well under elevated greenhouse gas concentrations and temperature stress - including structured capacity building programmes for farmers to adopt these practices, exemplifies an end-to-end innovation-to-adoption pathway.

- IIT Madras's emphasis on presenting coastal climate and infrastructure vulnerability data in simple, visual, and standardised formats combined with clear updating protocols and accessible portal management represents a best practice in research communication and knowledge management.

Policy Insights

- **Promote the integration of fragmented climate research into unified, policy-oriented platforms like ICARS to enable systematic, evidence-based decision-making at national and state levels.**
- Develop and enforce standardised frameworks for data collection methodologies, output formats, quality protocols, and inter-agency sharing mechanisms across all climate research institutions. The absence of standardisation is a system-wide barrier to collaboration, comparability, and cumulative knowledge-building for climate research.
- Strengthen and expand policies supporting early warning system development, climate-smart agriculture adoption, and region-specific climate impact assessments. IMD's early warning capacity improvements, TNAU's agricultural innovation ecosystem, and CSIR-NEERI's microclimate assessment methodology each demonstrate that sustained, targeted policy support including dedicated funding streams, inter-ministerial coordination mechanisms, and clear mandates for technology transfer and community outreach can convert research investments into measurable on-ground outcomes.

Way Forward

- Consolidate and put into practice ICARS as a national platform for integrating climate research across Centres of Excellence into a unified, policy-practical knowledge base.
- Invest in end-to-end technology transfer pathways that move climate innovations from Centres of Excellence laboratories to field-level adoption by farmers, local administrators, and communities. The gap between research demonstration and widespread adoption is the most persistent failure point in India's climate science ecosystem.
- Drawing on the data platform best practices demonstrated by IIT Madras and the ADRES portal developed under ICARS, a national climate data ecosystem should be established that aggregates outputs from all Centres of Excellence, IMD, ISRO, and state climate cells into a single, searchable, visually accessible platform.
- Strengthen the forecasting and early warning capabilities of IMD and state meteorological networks through targeted investment in observation infrastructure, data assimilation technology, and community communication systems. Equally important is investing in the last-mile communication infrastructure and community literacy programmes that ensure warnings reach vulnerable communities in time, in language and formats they understand, and with the clear practical guidance needed to convert a weather warning into a life-saving decision.

T010	Thematic: Technical Papers & Case Study Session 15.40 - 16.40 Sanrakshan
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Session Curator: ICARS-IIT Roorkee

Chair:

Prof. Indrani Chandra Sekhran, Former Advisor, MoEFCC

Co-Chair:

Prof. Sunil Nautiyal, CEENR-Institute for Social and Economic Change

Background: The Technical Papers and Case Study Session aims to provide a structured platform for researchers, practitioners, policymakers, and young professionals to present evidence-based insights and practical experiences related to climate change adaptation, disaster risk reduction, and resilience building. The session will showcase innovative research, field-based case studies, and policy-relevant findings that demonstrate effective strategies for addressing climate risks across sectors. By bringing together diverse perspectives from academia, government, civil society, and industry, the session seeks to promote knowledge exchange and encourage interdisciplinary dialogue. The discussions will contribute to identifying scalable solutions and best practices that can support resilient development pathways at local, regional, and national levels.

Key Discussion Points

- Climate change and rapid urbanisation are compounding and intensifying risks across India's diverse geographies. Collectively highlighting that unplanned urban growth is amplifying climate vulnerability faster than governance systems are adapting to manage it.
- A important and persistent governance gap exists between the generation of scientific risk knowledge and its integration into policy and planning decisions. Despite the existence of hazard maps, hydro-geomorphological risk indices, and satellite-based vulnerability assessments, these tools remain advisory rather than mandatory in India's urban planning and development approval processes.
- Intersectional vulnerability analysis reveals that climate risks fall disproportionately on the most marginalised communities and must be



explicitly addressed in adaptation planning. Women, low-income residents, and migrants face compounded vulnerabilities from poor housing quality, healthcare access gaps, and income instability that standard climate risk assessments fail to capture making intersectional vulnerability frameworks an essential tool for equitable adaptation planning.

- Innovative monitoring technologies for wildlife-human conflict and urban heat management are demonstrating strong potential but remain under-deployed due to data-sharing failures and lack of mandatory integration. The Nilgiri Biosphere's human-wildlife conflict case highlights important data-sharing gaps among officials and fragmented monitoring mandates undermining their effectiveness. Similarly, nano-water particle retrofits for air conditioning systems showing 30% improvements in energy efficiency address a rapidly growing climate adaptation challenge but require regulatory frameworks to drive adoption at scale.
- Circular design principles and biomass-based material innovation offer potential growth pathways to reducing the climate and environmental footprint of high-impact industries. The textile sector's contribution to pesticide use, greenhouse gas emissions, and toxic waste through cotton cultivation, polyester production, and chemical leather tanning represents an important and under addressed climate challenge.

Innovations and Good Practices

- SCOBY cellulose reinforced with natural fibres provides durability and moisture resistance while eliminating the pesticide use of cotton, the fossil fuel emissions of polyester, and the toxic chromium tanning of leather. When scaled through industrial fermentation and standardised bio-based finishing protocols, this innovation offers a competitive circular economy solution to one of the world's most environmentally damaging industries, demonstrating that sustainable materials can be grown rather than extracted.
- The deployment of 5 - 12 nanometre water particles around outdoor condenser units to enhance heat transfer has demonstrated a 30% improvement in coefficient of performance and up to 30% reduction in electricity load in experimental conditions as a modular, low-cost, water-efficient system that integrates with existing AC infrastructure without requiring unit replacement.
- After five years of collaborative development with the National Coastal Centre and Imperial College London - has produced devices capable of reducing incoming wave heights by 30 - 40%, providing important erosion protection without the ecological and visual impacts of conventional hard engineering solutions such as seawalls and rock armour

Policy Insights

- Mandate the integration of hazard maps, hydro geomorphological risk indices, and climate vulnerability assessments into urban planning approval processes as binding requirements rather than advisory inputs. Regulatory reform that requires sequential

hazard assessment, risk-based zoning compliance, and adaptive monitoring as mandatory conditions for development approval would systematically reduce the accumulation of climate risk in urban areas and protect the public investment in infrastructure that such development attracts.

- Strengthen institutional coordination frameworks across agencies responsible for disaster risk, urban planning, environment, and climate adaptation to eliminate the fragmented mandates that prevent science-policy integration. Establishing a formal inter-agency coordination protocols, shared data platforms, and joint accountability frameworks for climate-related planning decisions would address the system cause of India's science-policy gap rather than its symptoms.
- Promote climate-responsive infrastructure standards and livelihood diversification policies that explicitly address intersectional vulnerability. Adaptation planning frameworks at national, state, and district levels must be redesigned to incorporate the intersectional vulnerability dimensions - gender, age, disability, migrant status, and livelihood dependency.

Way Forward

- Establish mandatory risk-informed urban planning frameworks that integrate multi-hazard science into every stage of the development approval process. Drawing on the governance models of Japan, Switzerland, and New Zealand, India should develop a national regulatory framework requiring hydro geomorphological risk assessment, coastal erosion mapping, urban heat island analysis, and wildlife corridor consideration as mandatory inputs in master plan preparation, project approval, and post-construction monitoring.
- Scale proven climate innovation technologies. including nano-water AC retrofits, wave energy coastal protection devices, and SCOBY-based textiles. Establishing climate innovation accelerator programmes with procurement commitments, regulatory fast-tracking, and blended finance facilities would accelerate the journey from promising research to deployed solution across cooling, coastal protection, and sustainable materials sectors.
- Develop and make standard integrated preventive intelligence frameworks for human-wildlife coexistence that mandate cross-agency data sharing and community participation. Realising this potential requires MoEFCC, state forest departments, NDMA, and local governance bodies to establish formal data-sharing protocols, joint monitoring platforms, and community-based rapid response systems.
- Build intersectional climate vulnerability assessment as a standard methodology in India's national and state adaptation planning architecture. National adaptation planning guidance should mandate the use of intersectional vulnerability indices in climate risk assessments, should require that adaptation plans explicitly address the needs of women, migrants, persons with disabilities, and livelihood-dependent communities.

T011

Thematic. NbS for DRR - Building Resilience. Basin Approach 15.40 - 16.40 | Santulan

Session Partners: IUCN

Panellists:

- **Prof. Anil K. Gupta, WRDM, IIT-Roorkee, PI, ICARS – IIT Roorkee**
- **Prof. Parthankar Choudhury, Dean & Former Head, Department of Ecology and Environmental Sciences, Assam University,**
- **Dr. Panna Deb, Associate Professor, Department of Ecology and Environmental Science, Assam University**
- **Mr. Saravanakumar Veerasivam, Sector Specialist, Natural Resources Management, KfW, New Delhi**
- **Mr. Shawahiq Siddiqui, Advocate, Supreme Court of India, & Managing Partner, The Green Trial Law Group, New Delhi**
- **Ms. Salma Sultana, IUCN Meghna Storyteller Fellow, Assam**
- **Mr. Boka Rochill, IUCN Media Fellow (HFF), Nagaland**
- **Ms. Ashu Balhara, Senior Executive, ASSOCHAM & IUCN Youth for Meghna Fellow, New Delhi**
- **Ms. Meenal Pahuja, Senior Project Associate, IUCN India**

Background: The Eastern Himalayan Region, including India's North-Eastern states, faces increasing hydro-meteorological risks such as floods, landslides, forest fires, and human-wildlife conflict. Major river systems like the Brahmaputra and Barak play a critical role in shaping regional resilience but are under growing ecological pressure. IUCN's *Himalaya for the Future (HFF)* initiative and the BRIDGE programme aim to strengthen resilience through research, community engagement, and Nature-based Solutions (NbS). The Barak Basin particularly Cachar and Sribhumi districts illustrates these challenges with rising flood and drought risks and ecosystem degradation. Strengthening freshwater ecosystems such as wetlands, floodplains, and riparian vegetation is essential for disaster risk reduction, biodiversity conservation, and climate-resilient development.

Key Discussion Points

- Freshwater ecosystems. wetlands, floodplains, and river systems function as natural protective infrastructure that reduces disaster risk, regulates water flows, and supports climate resilience across the Eastern Himalayan region. Ecosystem services provided by wetlands and flood plains are not supplementary to disaster risk reduction but basic to it, and their systematic degradation directly increases the vulnerability of

communities and infrastructure to climate-driven hazards including floods, droughts, and extreme precipitation events.

- Nature-based Solutions offer multiple co-benefits that simultaneously address disaster risk reduction, biodiversity conservation, livelihood support, and climate adaptation. Unlike traditional grey infrastructure approaches that are costly, single-purpose, and increasingly insufficient in the face of compounding climate risks, NbS provide adaptive, landscape-level protection that improves over time as ecosystems recover.
- Legal and policy frameworks for NbS are inconsistent and operationally unclear, with land ownership and community rights representing the most important barriers to implementation in the Northeast. Customary and community land rights that are not formally recognised in property law create fundamental obstacles to restoration and conservation activities additionally, some existing government promotion schemes particularly plantation and horticulture programmes can be actively counterproductive to NbS goals by incentivising monoculture plantations over biodiverse ecosystem restoration.
- Community knowledge, lived experience, and social infrastructure are irreplaceable foundations of effective and equitable climate resilience. Strong community networks enable collective action during crises, local knowledge systems preserve ecological memory that guides sustainable resource use, and hybrid governance spaces that allow civil society and informal actors to complement formal institutions are essential for addressing the governance gaps that prevent NbS from reaching the communities that need them most.
- Water quality degradation in connected floodplain wetlands poses a compounding threat to both ecosystem function and community livelihoods that demands immediate attention. Wetlands with restoration potential are being actively degraded by nutrient pollution and wastewater discharge, undermining their capacity to function as natural infrastructure and support the fisheries and agricultural livelihoods that communities depend upon.



Innovations and Good Practices

- Moving beyond single-ecosystem conservation to landscape-level planning that treats the entire watershed as an connected system where the health of upland forests, mid-slope riparian buffers, and lowland floodplain wetlands are jointly managed to deliver integrated flood regulation, slope stabilisation, groundwater recharge, and biodiversity outcomes.

- IUCN Barak - Meghna Storyteller Fellowship : Community-led documentation of climate and ecosystem change through structured storytelling - a methodologically innovative approach to knowledge generation that trains young community members to systematically document lived experiences of climate impacts, ecosystem change, and livelihood transformation. By creating a structured bridge between community narratives and scientific and policy processes, this fellowship generates place-specific, culturally embedded knowledge that improves the relevance and equity of conservation and adaptation planning.
- The Rupabali Anua water quality assessment methodology demonstrates how combining scientific laboratory testing with accessible field measurement kits and community monitoring participation can generate practical, site-specific water quality data that identifies pollution hotspots, tracks seasonal dynamics, and recommends targeted interventions including floating treatment wetlands, invasive weed removal, decentralised wastewater treatment, and nutrient management.

Policy Insights

- Include Nature-based Solutions as a primary not supplementary approach in national and state disaster risk reduction and climate adaptation policies, with clear operational guidelines that replace or substantially complement purely engineering-based approaches. Policy reform should establish NbS as the default first-consideration in flood management, slope stabilisation, and coastal protection planning, with engineering solutions required to demonstrate that NbS alone is insufficient before being approved.
- Policy action must clarify and formalise community land tenure, recognise customary rights in property law, ensure that existing promotion schemes do not incentivise ecologically counterproductive plantation activities, and establish legal frameworks that enable communities to participate in and benefit from NbS initiatives on lands they have historically stewarded.
- Strengthen ecosystem-based watershed management policies across the Himalayan region with dedicated financing, inter-departmental coordination mandates, and inclusive governance frameworks that ensure useful participation of communities, indigenous peoples, and civil society. Effective NbS for disaster risk reduction in the Eastern Himalaya requires not just policy recognition but institutional architecture. Public finance must play an enabling role at early stages to attract subsequent private investment, and that long-term monitoring and documentation beyond project funding cycles is necessary to demonstrate NbS effectiveness and build the evidence base for sustained institutional support.

Way Forward

- Develop an integrated NbS implementation programme for the Barak - Meghna Basin and Eastern Himalayan region that combines ecosystem restoration, community governance, legal reform, and blended financing into a coherent, landscape-scale initiative. Drawing on the cross-sector collaboration potential identified in Cachar and Sribhumi districts, this programme should establish wetland restoration zones,

riparian buffer replanting programmes, floodplain protection designations, and community-managed agroforestry systems as connected components of a unified watershed management strategy.

- Establish dedicated intermediary institutions at regional and state levels capable of bridging policy, community, and research in support of NbS implementation. Creating state-level NbS implementation agencies or empowering existing institutions that can simultaneously engage government departments, community organisations, research institutions, and private financiers would address the coordination failure that prevents good policy from becoming effective practice.
- Scale community storytelling and participatory knowledge generation as a formal methodology within India's climate vulnerability assessment and adaptation planning systems. Building on the IUCN Barak - Meghna Storyteller Fellowship model, national and state adaptation planning frameworks should incorporate structured community knowledge documentation as a standard component of climate risk assessment.

C1

Parisamvaad : Agriculture and Water Security - Exploring the Potential of Risk -Resilience with Farmers and Technical Experts

14.15 - 15.15 | Parisamvaad Area

Curator: Catalyst Management Services

Panellists:

- **Mr. Bishwadeep Ghose, Country Director - Water For People**
- **Mr. Murali Dhar, Director-Sustainable Agriculture Program, WWF India**
- **Mr. Sarabjit Sahota, Disaster Risk Reduction Specialist, UNICEF India**
- **Mr. Ashish Gupta, Director – Jaivik haat**
- **Mr. Riddhish Soni, Founder-Aumsat Technologies LLP**
- **Mr. Kiran Kumar, Lead - Community Institutions & NRM, Vrutti**
- **Ms. Sulipta Das, Lead-Climate Action, CMS**

Background: India's agriculture sector faces increasing water stress due to climate variability, groundwater depletion, and water-intensive cropping patterns, directly affecting food security and farmer livelihoods. Addressing agricultural water security is therefore critical to strengthening climate resilience and sustainable resource management. This issue is central to national and global resilience agendas, including climate adaptation, food system stability, and water governance. The roundtable will bring together farmers, experts, policymakers, and finance actors to explore practical solutions that bridge field realities, scientific evidence, and policy action. By identifying actionable priorities for water-secure agriculture, the discussion aligns with the summit's goal of advancing integrated resilience strategies.

Key Discussion Points

- The fundamental challenge in India's water-agriculture nexus is not water use but water availability sustainability. India extracts 245 billion cubic litres annually with 80 - 90% going to agriculture, yet policy has disproportionately focused on improving use efficiency rather than ensuring water availability. The Punjab cropping system consuming more water than is naturally available exemplifies a broader national pattern where agricultural systems have been designed without proportionality to local hydrological limits
- Water scarcity, food insecurity, and migration form a vicious triangle that is already destabilising urban systems. Rural-to-urban migration cascade demonstrates that water risk in agriculture is not a sector issue confined to farms but a systems-level crisis that simultaneously overwhelms urban infrastructure, labour markets, and social services. making water resilience in agriculture a need for urban resilience as well.

- Farmers are not resistant to change, they are rational actors constrained by infrastructure lock-in, market uncertainty, and information gaps. Multiple speakers from field experience confirmed that when farmers decline to shift cropping patterns despite early warning information or extension advice, it is not ignorance but system constraint.
- Groundwater is a common pool resource whose sustainable management requires a shift from farm-level to hydrological unit-level governance. The operating unit for water governance must be the aquifer, sub-basin, or watershed not the individual farm because the hydrology does not respect administrative or land ownership boundaries.
- The tension between ecology and economy in water-agriculture planning is a false dichotomy that must be resolved by 2047. Multiple speakers converged on the insight that the choice between ecological sustainability and agricultural productivity is not a genuine trade-off but a policy construction.

Innovations and Good Practices

- Satellite-based aquifer mapping and groundwater detection technology made accessible and affordable to farmers by the Chandrayaan 2-derived satellite technology which is capable of penetrating subsurface geology to detect aquifer locations. It was deployed in Latur's (Marwad village) which was declared a dark zone by the Central Groundwater Board, demonstrates that space-grade remote sensing can be translated into farmer-level decision tools. Making this technology trust-worthy and affordable required direct researcher-community engagement including the researcher accepting accountability to the farmer.
- ClimAgro Analytics' development of precision farming decision tools that combine IMD's seasonal forecast data with geo-tagged farm location, crop type, and sowing date to calculate real-time crop water balance and generate location-specific irrigation schedules represents an important advance in making complex climate science practical at the individual farm level.



Policy Insights

- India's water allocation policy drafted in 1962 under Green Revolution imperatives must be comprehensively reviewed to reflect changed hydrological realities, new efficiency technologies, and the need to leave ecological flows in rivers. The policy was designed for a food-insecure, water-abundant country producing 50 million tonnes of food grains. India now produces 160 million tonnes but faces acute water insecurity

and continuing to operate under 1962 allocation frameworks is ecologically destructive and economically counterproductive. A 2047-oriented water allocation policy must balance consumptive agricultural use with river health, ecosystem services, downstream rights, and groundwater recharge requirements.

- Energy subsidy policy for agricultural electricity must be reformed as a need for groundwater conservation as long as electricity for pumping is effectively free to farmers, the economic incentive to over-extract groundwater remains overwhelming regardless of conservation awareness or extension advice. The energy-water-agriculture policy nexus is the most important cross-sector intervention point in India's groundwater crisis, and addressing it requires coordinated policy reform across energy, agriculture, and water ministries with farmer income protection mechanisms designed in parallel to ensure that subsidy removal does not translate into rural distress.
- Governance of water as a common pool resource must be institutionalised at the hydrological unit level through panchayat structures rather than fragmented sector institutions. Upstream-downstream payment for ecosystem services mechanisms, modelled on Himachal-Delhi watershed relationships and the World Bank-supported Maharashtra experience, should be piloted to financially incentivise catchment protection.

Way Forward

- Design and implement a managed agricultural transition programme with a defined 3 - 5 year transition pathway, farmer income support, and market development recognising that farmers cannot change cropping systems overnight without disrupting their entire production and marketing infrastructure. Governments must invest in a structured transition programme that simultaneously develops processing and market infrastructure for new crops, provides income support during the transition period.
- Build integrated, hydrological-unit-level water data platforms that synthesise groundwater board data, revenue department data, satellite imagery, and climate forecasts into transparent, community-accessible dashboards
- National water and agriculture programmes should systematically partner with FPOs to deliver integrated soil-water-crop-income diversification services, embed climate data literacy into FPO operations, create community climate funds at FPO level for maintenance of water conservation infrastructure, and pilot federated FPO governance models at sub-basin scale that can aggregate farm-level decisions into basin-level water balance management.
- Establish payment for ecosystem services mechanisms that compensate upstream watershed communities for the hydrological services they provide to downstream urban and agricultural users. The false separation between ecological conservation and economic productivity must be ended through financial mechanisms that make ecosystem stewardship economically viable for the communities who practice it.

C2

Parisamvaad : Sediment Dynamics, Reservoir Sustainability and Innovative Strategies

15.15 - 16.15 | Parisamvaad Area

Curator: IIT Kharagpur

Panellists:

- **Prof. Manish Goyal, Department of Civil Engineering, IIT Kharagpur**
- **Ms. Harshitha M S, Deputy Director at Central Water Commission, DoWR, RD&GR, Ministry of Jal Shakti**
- **Dr. Manish Pandey, Department of Civil Engineering, IIT Kharagpur**
- **Dr. Harinarayan Tiwari, CEO PANDT Soft Solution, Co-Founder, Floodkon**

Background: The session “Sediment Dynamics, Reservoir Sustainability and Innovative Sediment Management Strategies” addresses the growing challenge of reservoir capacity loss due to accelerated sedimentation driven by watershed degradation, extreme hydrological events, and climate variability. Excessive sediment deposition reduces storage, impairs hydropower generation, affects water supply reliability, and alters downstream sediment balance. Traditional dam designs often lack adaptive sediment management provisions, threatening long-term infrastructure sustainability. The session focuses on understanding sediment transport processes, improving monitoring and modeling tools, and advancing innovative solutions such as sediment bypass systems, density current venting, flushing, and nature-based catchment interventions to extend reservoir life and enhance climate resilience.

Key Discussion Points

- India has over 19,000 reservoirs providing important services. irrigation, hydropower, drinking water, and flood control but nearly 16 - 20% of gross storage capacity has already been lost to sedimentation, with projections indicating up to 50% loss by 2050 if no corrective action is taken.
- Reservoir sedimentation is intensifying due to a dual pressure of climate change and anthropogenic activity increasing rainfall intensity with fewer rainy days is accelerating erosion, while deforestation and land-use changes in upstream catchments are dramatically raising sediment loads entering reservoirs.
- Sedimentation was historically treated as a "problem for future generations" and was not adequately factored into dam design from the 1950s - 1970s. India is now reckoning with the compounded consequences across its 5,000+ large dams, many of which are aging without active sediment management plans.

- Existing sluice gates and underwater outlets in older reservoirs are frequently choked and non-functional in practice, reflecting a design-reality gap. Sediment management measures installed at the design stage were often not maintained operationally, rendering them ineffective precisely when most needed.
- There is no one-size-fits-all solution for India given its vastly diverse geography, hydrology, and rainfall gradient (20 cm to 2,000 cm annually). What works in the Himalayan belt with high sediment yield (2.6 mm/km²) is fundamentally different from what applies in the Kaveri or Godavari basins, necessitating region- and project-specific approaches.

Innovations and Good Practices

- Remote sensing and AI-assisted sedimentation monitoring is emerging as a cost-effective alternative to traditional bathymetric surveys. Studies such as the Samrat Ashoka Reservoir (Madhya Pradesh) have demonstrated ~0.9% annual capacity loss estimation with 80 - 90% accuracy using satellite-based methods, compressing months of field work into days.
- Sediment bypass tunnels and silt trap dams (internationally termed "Sabo dams" in Japan) offer promising upstream interception models. These capture sediment before it reaches the reservoir, though their applicability in the Himalayas requires careful study given high bed loads, coarser particles, and challenging bedrock conditions.
- Dredged and extracted sediment as a construction material revenue stream is being piloted at select sites, reframing reservoir silt from a liability into a commercial resource (for construction, land reclamation, or industrial use) offers both financial sustainability and incentive for regular de-siltation, representing a model worth scaling through a formal policy framework.

Policy Insights

- A national sediment mapping framework, akin to earthquake hazard zonation maps, is urgently needed to classify India's reservoirs by sedimentation risk level (high, moderate, low), enabling governments to prioritize interventions, allocate resources rationally, and set region-specific management protocols for state and central agencies.
- CWC's existing guidelines under the DRIP programme and the periodically issued Compendium of Reservoir Siltation provide a baseline, but remain limited in coverage (approximately 200 of 5,000 large dams surveyed). There is an important policy gap in



scaling these frameworks into binding, project-specific sediment management mandates applicable across all dam categories.

- Sediment management must be mainstreamed into dam design from the start not treated as an operational afterthought. Policy frameworks should mandate sediment impact assessments, low-level sluice provisions, and projected capacity-loss modelling as standard requirements in all new dam planning approvals, particularly in high-yield sediment zones.

Way Forward

- Develop region-specific, project-by-project sediment management plans through tripartite collaboration between academic institutions, industry consultants, and government agencies (central and state). Policies must account for geography, hydrology, dam purpose (storage vs. run-of-river), and operational flexibility before prescribing management techniques.
- Establish a national policy framework to monetize reservoir silt, a structured scheme enabling states to commercially extract, certify, and sell dredged sediment as a construction resource would incentivize regular de-siltation, generate revenue, reduce costs of sediment management, and align with India's circular economy and sustainability goals under Vision 2047.
- Invest in data quality, consistency, and open accessibility as basic infrastructure for next-generation AI and HAI (Human-AI) modelling. Current gaps in sediment discharge, rainfall intensity, and bathymetric data limit model reliability. Government programmes should mandate open data sharing between central agencies, state bodies, and research institutions to enable predictive sediment management at scale.
- Integrate demand-side water management into the broader sedimentation resilience framework, sustainability of reservoirs cannot be addressed through engineering alone. Reducing per capita water and energy demand through policy, pricing, and behavioural change will lower pressure on reservoir systems and extend their functional life, directly contributing to the goals of Mission 2047.

R012

Concluding and Way Forward 16.40 - 18.00 | Main Hall

Session Partners: Ministry of Home Affairs – GoI, WRDM – IIT Roorkee, CSIR-NGRI, UNU-CRIS, Ladakh University

Speakers:

- **Prof. Kalachand Sain, Chairperson – Expert Committee, NMSKCC**
- **Prof. (Dr.) Saket Kushwaha, Vice-Chancellor, University of Ladakh**
- **Shri Amit Sharma, IAS, Director – Census Operations, MHA-GoI**
- **Prof. Anil K. Gupta, Professor, WRDM-IIT Roorkee and PI-ICARS-IIT Roorkee**
- **Prof. Nidhi Nagabhatla, Cluster Coordinator, UNU-CRIS**

Opening Remarks

Prof. Anil K. Gupta, ICARS-IIT Roorkee framed the session as the integrative capstone of a day spanning 14 sessions. Prof. Gupta called for distilling the day's knowledge into five cross-cutting strategic themes. He said that climate action planning can be approached sector-wise, region-wise, or through the mitigation-adaptation-resilience-recovery continuum and that choosing among these frameworks is itself a important policy challenge. He said collaborative, non-siloed solutions, and invited the panel to identify integrative pathways that translate the day's rich knowledge exchange into coherent, practical outcomes for the broader RESSUMMIT process and the goals of Viksit Bharat 2047.



Remarks

Prof. Saket Kushwaha, Ladakh University drawing from decades of interdisciplinary research said that climate resilience cannot be achieved through optimization alone. every gain in one objective invariably demands compromise in another. Using agricultural production modelling as an analogy, he argued that forums like RESSUMMIT serve a vital purpose in bringing diverse thought processes to a common level, channelling collective energy toward shared national goals. He called for institutions to redefine their internal mandates with

clarity, and stressed that useful climate action requires society-wide participation, referencing Africa's community-led environmental observance days as an inspiring model for coordinated societal engagement.

Remarks

Shri Amit Sharma, IAS reflected on his tenures across Ladakh and Mizoram, said that India's vast geographic and ecological diversity demands region-specific resilience strategies, that no single framework can serve all contexts. He said landmark carbon-neutral initiatives in Ladakh. Including including the introduction of five hydrogen fuel cell buses operating at 12,000 feet and EV freight vehicles within Leh Township, both achieved through inter-institutional collaboration with NTPC and the University of Ladakh. He said the Prime Minister's vision of making Ladakh India's first carbon-neutral UT, and said that northeast India's water-based transport and mangrove conservation in Kerala offer equally instructive regional models for context-sensitive resilience.

Remarks

Prof. Nidhi Nagabhatla, said the important role of nature-based solutions (NbS) in building disaster resilience across scales - from national policy frameworks down to regional and household-level implementation. She stressed the importance of collaborative knowledge systems that integrate scientific research with local and indigenous knowledge, enabling more effective DRR outcomes. She also referenced ongoing work with Wetlands International on integrating wetland-based NbS into district-level disaster management plans, and called for the development of customizable frameworks. adaptable at city, block, and village levels. to ensure NbS adoption is contextually appropriate, institutionally supported, and operationally sustainable across India's diverse landscapes.

Concluding Remarks

Prof. Kalachand Sain presented a panoramic view of India's escalating climate vulnerability from Himalayan glacial retreat, avalanches, and flash floods, to coastal erosion, extreme heatwaves, and agricultural disruption. Prof. Sain outlined a five-pronged national strategy for resilience. These comprised standardized, region-specific risk assessment with strict implementation guidelines, disaster-resilient infrastructure blending modern engineering with traditional and nature-based knowledge, web-based sensor networks enabling continuous hazard monitoring and early warning, development of hybrid green energy technologies to reduce fossil fuel dependency and community-engaged disaster response and rehabilitation readiness. He said DST's contributions under the NMS and NMSKCC programmes, including urban flood forecasting tools and climate data portals, as concrete steps toward evidence-based resilience policy.

The concluding session of Day 1 ended with a emphasis on developing an integrated, multi-tier climate resilience framework synthesizing the opening day's 14 sessions into four to five cross-cutting strategic themes. covering risk assessment, NbS, early warning, energy transition, and community preparedness and the CAPP-RES Strategy Edition 2026 outcome declaration.



Fire Side Leader's Talk 18.30 - 20.00 | Gyan Vatika

Curator: ICARS - IIT Roorkee

Lead Talk:

- **Shri Krishna S. Vatsa, Head of the Department and Member, National Disaster Management Authority**

Lead Panelists:

- **Prof. Vinod K. Sharma, Vice-Chairman, Sikkim State Disaster Management Authority**
- **Prof. R. K. Bhandari, Former Director, CSIR-Central Building Research Institute**
- **Prof. Kalachand Sain, Chairperson- Expert Committee, NMSKCC**

The Fireside Leader's Talk brought together four distinguished voices spanning National Disaster Management Authority, frontier geoscience research, state-level capacity building, and applied geology. Each offering a distinct but deeply complementary perspective on what it takes to build disaster resilience in India. The conversation was candid, experiential, and deliberately grounded in hard-won lessons rather than theoretical prescriptions, setting a reflective tone as Event 1 - Climate Knowledge Forum drew to a close.

Lead Talk



Shri Krishna S. Vatsa, opened the dialogue by challenging the tendency to view disaster mitigation as a straightforward investment decision. Drawing from his extensive experience at the helm of India's apex disaster management body, he argued that mitigation particularly for slow-onset, geographically complex hazards like landslides demands painstaking site-specific investigation, calibrated technical judgment, and sustained institutional commitment over years, not

"Effective disaster management must protect people's livelihoods and dignity alongside their physical safety. Bridging the gap between technical planning and local realities requires not just smarter tools, but a genuinely empathetic and community-rooted approach to risk governance."

months. Large-scale mitigation programmes, he said, invariably run up against the limits of existing institutional capacity and the shortage of indigenous technical expertise. Yet for Shri Vatsa, the deeper and more persistent challenge lies elsewhere in the gap between what technical planners

design and what affected communities actually need. Effective disaster management, he said, must protect people's livelihoods and dignity alongside their physical safety. Displacement in the name of risk reduction can itself become a form of harm. Bridging this human gap, he argued, requires not just smarter tools or artificial intelligence, but a genuinely empathetic and community-rooted approach to risk governance.

Prof. R.K. Bhandari reinforced and deepened Leader's Talk deliberations by bringing a lifetime of scholarly and field

"The real bottleneck is not the absence of knowledge, it is the absence of institutional depth and indigenous capacity to translate that knowledge into local action "

engagement with India's most complex geophysical hazards. He echoed Shri Vatsa's caution about the deceptive simplicity of "invest in mitigation" as a policy prescription, stressing that hazards like landslides resist standardized responses -

each site carries its own geology, hydrology, and social context. He argued that the real bottleneck in India's disaster risk reduction journey is not the absence of knowledge but the absence of the institutional depth and indigenous technical capacity needed to translate that knowledge into safe, locally appropriate action at scale. While welcoming innovations such as AI-driven risk modelling and remote sensing, Prof. Bhandari was equally insistent that no technology substitutes for empathy for the ability of planners, engineers, and administrators to genuinely understand and respond to the lived realities of vulnerable communities. Building that empathetic capacity, he ended, is as important as any technical or infrastructural investment.



Prof. V.K. Sharma, shifted the lens to the enabling power of systematic capacity building, sharing vivid and inspiring examples from his work across national and state platforms.

"Grassroots awareness is not a soft add-on to resilience policy, it is its most durable foundation "

He described how, drawing from national frameworks and the vision of senior leadership, his team had worked to train a wide cross-section of partners - engineers, masons, local officials, panchayat members, and school communities in disaster-resilient construction and preparedness practices. His rich experience in Sikkim following devastating South Lohrak Lake Outburst was particularly instructive. By investing in widespread, practical training, the state was able to help the construction of thousands of safer homes. With communities themselves becoming active agents of resilient rebuilding rather than passive recipients of external assistance. Prof. Sharma's message was unambiguous - knowledge about disaster risk must not remain confined to technical institutions. It must percolate down to every mason who lays a foundation, every teacher who guides a classroom, and every panchayat member who shapes a local land-use decision. Grassroots awareness, he argued, is not a soft add-on to resilience policy. It is its most durable foundation.



Prof. Kalachand Sain, brought the geoscientist's eye to the conversation, grounding the discussion in the hard lessons of India's most devastating recent

disasters. Dharali, Chamoli, Kedarnath, and Joshimath. Each of these events, he argued, is not just a tragedy but a repository of knowledge about what happens when development outpaces preparedness and when construction ignores load-bearing realities of fragile terrain. Prof. Sain stressed the urgent need for early warning systems backed by real-time hydro-meteorological and geological monitoring, and called for far stricter regulation of construction and land use in high-risk mountain zones where glacial lake expansion and rising temperatures



are compounding pre-existing vulnerabilities at an accelerating pace. He drew a telling international comparison. Japan's stringent building codes have saved countless lives in earthquake-prone zones, while Haiti's near-absence of such frameworks turned a comparable seismic event into a catastrophic humanitarian disaster. The lesson for India, he mentioned, is clear - preparedness embedded in regulation, planning standards, and innovative engineering practice is not a luxury but a need for coexisting safely with the geological and climatic realities of the subcontinent.

The Leader's Talk ended on a celebratory note. With with a cultural programme and gala dinner offering participants an opportunity to step back from the intensity of the day's deliberations, forge new connections across disciplines and institutions, and collectively renew their commitment to the shared mission of building a more resilient and sustainable India.

Glimpses of Gala Night



India Resilience Forum

Regional & Specific Contexts

Event 2

Regional Vulnerabilities and Resilience- Mountains, Desert and Coastal Risks

*Strengthening Transboundary Cooperation, Evidence-Based
DRR, Adaptation, Including NbS, in Mountain Regions Through
Active Institutional Collaboration*

*Forum Launch, High Level Plenary,
Feature Thematic Session, Concluding and
Way Forward & Colloquy*

Day 02 | March 17, 2026



India Resilience Forum

Regional & Specific Contexts

Event3

Resilient Health System and Emergencies - *Human Health and Wellbeing - Emergencies & Resilience*

*Building Resilient Health Systems to Manage Long-term
Environmental Risks and Public Health Emergencies*

*Forum Launch, High Level Plenary,
Feature Thematic Session, Concluding and
Way Forward & Colloquy*

Day 02 | March 17, 2026





SESSION-WISE PROCEEDINGS

Introduction

Thematic Context

The second day of RESSUMMIT 2026 opened with a joint inaugural of two parallel thematic streams, Regional Vulnerabilities and Resilience, and Resilient Health Systems and Emergencies. Convened as part of a summit spanning 47 sessions and over 800 delegates across three days, the inaugural set the tone for a day of deep, cross-sectoral dialogue on India's most pressing climate and disaster resilience challenges. The session brought together voices from national disaster management, climate science, public health, international diplomacy, and mountain ecology, collectively affirming that resilience, in India and globally, can no longer be built sector by sector.

I013	Forum Launch - Inaugural Session 9.00 - 10.45 Main Hall
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Session Partners: NDMA, MoEFCC, NITI Aayog, NCDC, Australian High Commission, Deakin University, UNDRR-Asia Pacific, ICARS-IIT Roorkee

Speakers:

- **Ms. Rita Missal, Member, NDMA**
- **Dr. Akhilesh Gupta, Dist. Visiting Professor, CoEDMM - IIT Roorkee**
- **Ms. Nameeta Prasad, Joint Secretary (Mountain), MoEFCC**
- **Dr. Aakash Shrivastava, Addl. Director, NCDC**
- **H.E Mr. Jack Miller, Second Secretary, Dept. of Home Affairs, High Commission of Australia in India**
- **Prof. Mary Ana McGlasson, Director, CHL-Deakin University**
- **Prof. Anil K. Gupta, Professor, WRDM IIT Roorkee, PI-ICARS-IIT Roorkee**

Welcome Remarks

Prof. Anil K. Gupta (PI, ICARS-IIT Roorkee) opened the session by framing RESSUMMIT 2026 not as a conventional conference but as a curated assembly of 47 partner organizations, each bringing field projects, implementing agencies, and case studies to the table. He situated the summit within India's broader resilience architecture, recalling that Day 1 had launched the Climate Knowledge Network of India under the National Mission for Strategic Knowledge on Climate Change. Day 2, he explained, would focus on regional vulnerabilities across mountain, coastal, and dryland geographies, alongside the health implications of climate change. He emphasized that the summit's core purpose is to close a globally recognized gap, the research–policy–practice interface, through collaboration and co-development from concept to implementation.

“We need to strengthen each other's efforts by collaborating, learning from each other and co-developing. from concept to implementation.”

Remarks

Dr. Akhilesh Gupta, Former Secretary, Department of Science and Technology

traced the institutional origins of ICARS to a defining moment of scientific controversy, the IPCC's unsubstantiated claim that Indian glaciers would disappear by 2035. This galvanized the Government of India into building an evidence-based national research program, eventually establishing over 25 Centres of Excellence under the National Action Plan on Climate Change. He was emphatic that ICARS's mandate is the integration of knowledge, not its creation, converting research from multiple institutions into concrete policy directions. He pointed with pride to India's district-wise climate vulnerability assessment, making India one of only a handful of nations with risk data at that level of granularity.

"The knowledge that India has today on climate change is at par with the global knowledge. Now we have to convert it into policy directions."

Remarks

Dr. Aakash Shrivastava, National Centre for Disease Control (NCDC) drawing from his experience in India's National Health Adaptation Plan emphasised that resilience cannot be understood as a sectoral achievement, it must be systemic. He positioned health as the ultimate convergence point for all other systems: when floods disrupt supply chains, hospitals suffer; when heat waves stress infrastructure, health services buckle; when ecosystems degrade, nutrition and disease patterns shift. He called on the summit's cross-sectoral architecture, spanning climate, health, water, agriculture, finance, and governance, as a rare and necessary integration of deeply interdependent realities.

"Resilience cannot be built sector by sector. It must be built system by system. Health, environment, infrastructure, industry, water, agriculture, finance, governance, all are deeply interconnected. A resilient health system depends on resilient water systems, resilient food systems, safe industries, a clean environment, and stable infrastructure."

Remarks

Prof. Mary Ana McGlasson, Centre for Humanitarian Leadership, Deakin University brought over three decades of global crisis experience to her address, spanning clinical nursing and disaster response across more than 30 countries. She described a formative early experience where every formal system had collapsed, roads flooded, hospitals dark, yet a small clinic continued to function, sustained entirely by the commitment of nurses and community health workers. This experience, she said, permanently shaped her conviction that resilience begins not with systems but with people. She praised India's cyclone early warning systems as globally studied models, while calling for three immediate priorities: integrating health into disaster risk planning, investing in frontline professionals, and rebuilding institutional trust with communities.

"Resilience does not begin with systems. It begins with people, with the professionals who remain in their communities during crisis, with the trust between health workers and the"

populations they serve, and with institutions that support them to keep going even under enormous pressure."

Remarks

Mr. Jack Miller, Second Secretary, Australian High Commission, New Delhi spoke from direct operational experience within Australia's National Emergency Management Authority during the 2020 Black Summer bushfires and the COVID-19 pandemic. He described the bushfire's staggering scale, 33 deaths, 3,000 homes destroyed, and 17 million hectares burned, and drew three hard-won lessons. First, disasters are no longer singular; resilience must be built for concurrent, compounding, and complex all-hazard scenarios simultaneously. Second, community-led volunteers, who comprised 78% of all bushfire responders, are among a nation's most powerful resilience assets. Third, every dollar invested in preparedness before a disaster saves three to eight dollars in response costs, demanding a fundamental shift from reactive to proactive governance.

"You can't think of resilience in a singular term. You need to look at it as complex, compounding and concurrent all-hazards potential. For every dollar invested before a disaster in preparedness, three to eight dollars is saved later."

Remarks

Ms. Namita Prasad, Joint Secretary, Mountain Division, MoEFCC delivered a data-rich address on the accelerating climate crisis facing the Indian Himalayan Region. She cited alarming evidence: glaciers in the Hindu Kush Himalaya have disappeared 65% faster in the 2010s than the previous decade, with 80% of glacial volume potentially lost by 2100 under current emissions. Snow depth could reduce by 50 to 90% under high-emission scenarios, threatening the freshwater security of nearly 1.9 billion people across 12 major river basins. The 2013 Uttarakhand deluge, the 2021 Chamoli disaster, and the 2025 Dharali flash floods were cited as tragic evidence of cascading hazards. She called for the Himalayas to be recognized as vital national ecological infrastructure and proposed that institutions collaborate to produce joint policy papers from the summit's deliberations.



"As India strides towards Vision 2047, the Himalayas must be unequivocally recognised as vital national ecological infrastructure. Our water security, food systems, energy future, and climate resilience depend on the health of these mountains."

Inaugural Address

Ms. Rita Missal, Member, National Disaster Management Authority (NDMA) opened with an account of recent disaster losses, coastal and Himalayan hazards across seven states in the past year alone causing combined losses of approximately ₹56,000 crore, with 50%

concentrated in Himalayan states. She described NDMA's evolving vision for a National Resilience Mission for the mountain region, combining early warning, community preparedness, infrastructure resilience, and a whole-of-system approach. She was candid that disasters consistently outpace the systems built to manage them, and stressed that institutional leadership and on-ground compliance are as critical as policy and funding. She called for a smooth integration of response, preparedness, mitigation, and recovery.

"Our vision is an institutionalised, end-to-end disaster management system that anticipates risks, responds faster, repairs stronger, reduces future losses, and safeguards resilience through dedicated financing. It's not sector by sector, it's all together."

The inaugural of Day 2 concluded with a vote of thanks by Prof. Gupta, who acknowledged all dignitaries, highlighted the day's packed programme of 25 sessions spanning regional vulnerabilities and health themes, and drew attention to special innovations on display, including NDRF exhibitions, indigenous instruments showcased by SDRF Uttar Pradesh, and the upcoming Industry Symposium on Day 3. The session affirmed a collective commitment to translating the summit's knowledge exchange into concrete policy partnerships, collaborative research, and on-ground resilience action across India's most vulnerable regions.

P014

High Level Plenary : Mountain Resilience and Sustainability in Changing Climate | 11.15 - 12.15 | Main Hall

Session Partners: GIZ, IIT Delhi & ICARS-IIT Roorkee

Guests:

- **Prof. Kalachand Sain Chairperson-Expert Committee, NMSKCC**
- **Ms. Nameeta Prasad, Joint Secretary (Mountain), MoEFCC**
- **Dr. Akhilesh Gupta, Dist. Visiting Professor, CoEDMM - IIT Roorkee**
- **Dr Rajesh Joshi. Scientist & Regional Head, Sikkim Regional Centre , G.B. Pant NIHE**
- **Mr. Sarat Kumar Das, State Project Officer, Govt. of Tripura**
- **Mr. Prahlad Singh Adhikari, Secretary, HAST**

Background: Himalayan river basins are increasingly vulnerable to compounded risks arising from glacier retreat, erratic precipitation, flash floods, landslides, rapid urbanization, infrastructure expansion, and ecosystem degradation. Fragmented governance and sectoral planning approaches limit effective basin-scale risk management, highlighting the urgent need for integrated, multi-hazard, climate-responsive resilience frameworks across Himalayan states. These river basins in Himalaya not only sustain water, food, energy, and ecological security for millions, but also linking upstream fragility to downstream national stability. Strengthening Himalayan resilience directly supports India's commitments under global climate adaptation frameworks, disaster risk reduction priorities, and sustainable development pathways, while contributing to regional water security and transboundary ecological stability. The session advances Vision 2047 by promoting basin-scale, risk-informed development integrating climate science, ecosystem restoration, institutional capacity, and sustainable financing. It strengthens the science-policy-practice interface, supports Net Zero pathways, and aligns with RESSUMMIT's mandate to embed resilience and sustainability into India's long-term developmental trajectory.

Key Discussion Points

- The region is experiencing elevation-dependent warming at nearly twice the national average, with glacier retreat, shifting treelines, and expanding glacial lakes. These changes are disrupting biodiversity, water cycles, and ecological boundaries, directly threatening the livelihoods and food security of nearly two billion people who depend on Himalayan ecosystems for freshwater, agriculture, and essential services.
- Extreme events, floods, landslides, avalanches, cloudbursts, and glacial lake outburst floods, are occurring with greater frequency and increasingly in combination,

amplifying risk in densely inhabited zones. Disasters such as the 2013 Uttarakhand deluge, 2021 Chamoli event, and 2025 Dharali floods demonstrate the lethal speed of cascading hazards, underscoring that single-hazard planning frameworks are wholly inadequate for the complexity of Himalayan risk.

- Disaster management in mountain regions remains siloed across separate departments with limited inter-agency coordination, weakening preparedness and response effectiveness. The absence of integrated, multi-hazard institutional frameworks means that risks, often compounding across sectors like water, health, and infrastructure, are addressed piecemeal rather than systemically, eroding overall resilience despite significant investments in individual schemes.
- Micro-level vulnerability mapping, basin-level assessments, and risk zonation are critical for understanding the diverse and complex terrain of Himalayan regions. Emerging risks such as cross-border embankment-induced backflow flooding and urban inundation in states like Tripura highlight that vulnerability indices must be regularly updated to reflect ground realities.
- Effective resilience requires integrating scientific expertise with local and experiential knowledge, community-centred preparedness, and interdisciplinary problem-solving. Community volunteerism, local coping mechanisms, and capacity-building initiatives must be systematically supported to ensure that resilience strategies are practical, contextually appropriate, and scalable across diverse mountain geographies.

Innovations and Good Practices

- Web-based sensors, real-time monitoring networks, and integrated multi-hazard early warning systems are being promoted as essential tools for improving disaster preparedness and enabling timely community response. These technology-enabled approaches move beyond single-hazard detection to capture the compound and concurrent nature of Himalayan disasters, supporting faster decision-making at both institutional and community levels.
- Slope stabilization, forest management, and water system restoration are being adopted as scalable, cost-effective strategies to reduce hazard exposure and restore ecological function..
- Initiatives such as community volunteerism networks, ham radio communication systems, and regular disaster drills are strengthening last-mile connectivity and local response capacity. These grassroots practices, often low-cost and highly contextual, have proven effective in bridging institutional gaps during emergencies, particularly in remote Himalayan communities.

Policy Insights

- Policymakers must shift from fragmented, hazard-specific disaster management to coordinated institutional mechanisms that integrate early warning, preparedness,

response, and recovery across departments. Dedicated inter-agency convergence platforms, aligned with NDMA, SDMA, and DDMA, are essential to enable a whole-of-system approach.

- Mountain-specific adaptation strategies must be embedded into mainstream development planning through enforceable building codes, micro-level vulnerability mapping, and basin-level risk assessments. The Himalayas must be formally recognized as vital national ecological infrastructure in policy frameworks.
- Financing mechanisms must be calibrated to updated vulnerability indices, ensuring that the most exposed communities and geographies receive adequate and timely resources.

Way Forward

- Develop and implement a coordinated, technology-enabled multi-hazard early warning system for the Himalayan region, linking national institutions such as NDMA, CSIR-NGRI, GBPNiHE, and ICARS with state disaster management authorities. This system should ensure real-time data flow, community-level last-mile communication, and smooth transition from warning to preparedness action.
- Institutions including IIT Roorkee, GBPNiHE, ICARS, NDMA, MoEFCC, and international partners should collaboratively produce working papers and policy briefs from the summit's knowledge exchange. These outputs should directly inform India's Disaster Risk Reduction frameworks, National Action Plan on Climate Change, and Vision 2047 goals, ensuring that cross-sectoral dialogue generates tangible, evidence-based policy recommendations rather than remaining at the level of discussion.
- Proven grassroots practices, volunteer networks, local coping mechanisms, ecosystem-based adaptation, and nature-based solutions, must be systematically documented, evaluated, and scaled across Himalayan states. Policy and financing frameworks should incentivize community leadership in resilience, integrating local knowledge with scientific inputs to create contextually appropriate, cost-effective, and sustainable adaptation pathways for mountain regions.
- Himalayan resilience must move from the margins to the centre of India's development planning, with dedicated financing streams, regulatory reform, and institutional mandates ensuring that every infrastructure investment, land use decision, and climate adaptation initiative in mountain regions is risk-informed. Stronger inter-ministerial coordination across MoEFCC, Ministry of Jal Shakti, Ministry of Health, and NDMA is essential to implement a genuinely integrated national resilience mission for the mountains.

S015

Feature: Avoidable Deaths Network: India Chapter Launch **12.15 - 12.35 | Main Hall**

Session Partners: UNDP, FCDO, NITI Aayog, ICARS-IIT Roorkee

Guests:

- ***Dr. Jugal Kishore, Former Director, Community Medicine, VMMC & SH***
- ***Dr. Anil K. Gupta, PI- ICARS- IIT Roorkee***
- ***Md. Nadeem G. Siddiqui, Jt. Secretary, DMD-Govt. of Bihar***
- ***Dr. Nibedita S Ray-Bennett, Professor of Risk Management University of Leicester***
- ***Dr Ramya P., Director-KSPH, KIIT***
- ***Dr. Pratap K. Jena, Associate Professor, KIIT***
- ***Dr. Nikhil Paul, Kasturba Medical College, Mangalore***

Background: Avoidable deaths caused by disasters, health emergencies, climate extremes, road accidents, and environmental risks remain a major challenge in India despite advances in science, governance, and emergency response systems. Reducing such deaths requires coordinated action across sectors including disaster risk reduction, public health, infrastructure safety, climate adaptation, and community preparedness. The launch of the Avoidable Deaths Network (ADN) India Chapter aims to create a collaborative platform that brings together policymakers, researchers, practitioners, and civil society to share knowledge, strengthen data-driven decision-making, and promote integrated risk management strategies. By fostering multi-sectoral dialogue and partnerships, the ADN India Chapter will support efforts to minimize preventable fatalities and enhance national resilience.

Key Discussion Points

- Deaths from lightning strikes and snakebites, among the most common disaster and climate-related fatalities in India, are highly preventable yet persistently under addressed. The central message of the session was that stronger collaboration, data-driven action, and targeted capacity-building can significantly reduce these losses across India's most vulnerable populations.
- Reducing avoidable deaths cannot be the responsibility of any single sector. Health systems, disaster risk reduction agencies, infrastructure planners, community outreach networks, and early warning services must work in coherence.

- A key insight from the session was that learning from how different countries and regions approach avoidable deaths can sharpen everyone's efforts. The ADN's structure, combining global networks with country-specific chapters, is designed precisely to enable this shared learning.
- Evidence from Bihar demonstrated that combining improved early warning systems with timely communication and strong community awareness is already yielding measurable reductions in lightning-related deaths. This practical, ground-level experience reinforces that technology and community engagement together, not technology alone, are the most effective levers for preventing climate and disaster-related fatalities at scale.



- The session repeatedly emphasized that global frameworks only deliver results when local leaders, institutions, and communities take ownership of prevention efforts. Sustained impact depends on embedding avoidable death prevention into regular institutional practice, not limiting it to awareness campaigns or international observances, and on empowering local champions to adapt and apply global knowledge within their specific state and community contexts.

Innovations and Good Practices

- Bihar's model explicitly targets the most vulnerable groups, farmers, migrant workers, women, children, and tribal communities, recognizing that avoidable deaths are concentrated among those with the least access to information, services, and protective infrastructure. This multi-layered approach is already demonstrating positive results, particularly in reducing lightning fatalities.
- The establishment of the Avoidable Deaths Network India Chapter creates a structured mechanism for context-specific focus, addressing India's unique risk profile including snakebite and lightning, while remaining connected to international knowledge and best practices.
- The explicit combination of better early warnings, timely communication channels, and strong community awareness programmes has proven effective in reducing lightning-related deaths in Bihar

Policy Insights

- Deaths from lightning, snakebite, floods, and heat waves must be formally recognized in policy as preventable public health and climate-risk issues, not isolated incidents. This requires coordinated policy frameworks spanning health, disaster risk reduction, infrastructure, and community outreach, with dedicated budgets, accountability mechanisms, and measurable targets, rather than fragmented, sector-specific responses that consistently leave prevention gaps unaddressed.

- Policymakers should align DRR and public health planning at national and state levels, ensuring that vulnerability assessments, preparedness investments, and community engagement programmes address the full spectrum of preventable fatalities rather than responding to hazards in isolation.
- Aligning this ADN with India's Vision 2047 resilience goals and with existing national frameworks such as the National Disaster Management Plan would institutionalize knowledge exchange and accelerate nationwide reduction of avoidable deaths.

Way Forward

- The ADN India Chapter should be implemented with clear institutional anchoring, defined partnerships across health, DRR, and community sectors, and a structured agenda for the first phase of work. Priority areas, including lightning, snakebite, and flood-related deaths, should be identified based on national mortality data, with dedicated working groups, research collaborations, and state-level engagement plans developed to ensure the chapter moves from launch to concrete, measurable action.
- State disaster management authorities, health departments, and community organizations in high-risk states should be supported to adapt and implement this model, with central coordination through the ADN India Chapter and technical support from national institutions such as NDMA and NCDC.
- A significant gap identified in the session is the absence of strong, disaggregated data on avoidable deaths from climate and disaster events. A national data system, linking health surveillance, disaster loss databases, and community-level reporting, should be established to track fatalities from lightning, snakebite, heat, and floods.
- India should actively engage with ADN's international network to systematically learn from other countries' approaches to avoidable death prevention, adapting globally proven strategies to India's diverse risk landscape.



P016

**High Level Plenary : Human Health, Climate Change and Disasters:
Resilience & Preparedness
12.35 - 13.35 | Main Hall**

Session Partners: AOEH, KIIT-SPH, GIMS, BRB

Panellists:

- *Dr. Aakash Shrivastava, Addl. Director, NCDC*
- *Prof. (Dr.) Jugal Kishore, Former Head, Department of Community Medicine, VMMC*
- *Dr. Rambha Pathak, HoD, Community Medicine, GIMS*
- *Mr. Sanjay Sharma, Director, Resource Mobilization, Bal Raksha Bharat*
- *DR. Sarabjit Singh Sahota, DRR Expert, UNICEF*
- *Dr. Anindan Debnath, Maulana Azad Medical College*
- *Prof. Mary Ana McGlasson, Deakin University*

Background: Climate change is increasingly influencing human health through rising temperatures, extreme weather events, air and water quality degradation, and the spread of climate-sensitive diseases. Disasters such as floods, heatwaves, cyclones, and droughts place additional stress on already vulnerable health systems and communities. These impacts disproportionately affect the elderly, children, marginalized populations, and those with limited access to healthcare services. Strengthening resilience in the health sector requires integrating climate risk assessment, disaster preparedness, and public health planning. This session will explore multi-sectoral strategies that link climate adaptation, disaster risk reduction, and health system preparedness to protect communities, strengthen emergency response capacity, and promote climate-resilient healthcare systems.

Key Discussion Points

- Rising temperatures, extreme weather events, and environmental degradation are simultaneously increasing the burden of infectious diseases, non-communicable diseases, and mental health conditions. India's diverse regional vulnerabilities mean that populations across floodplains, urban slums, and climate-sensitive zones are already experiencing measurable increases in disease burden, with the most vulnerable communities facing compounding and disproportionate health impacts.
- Heatwaves, floods, and poor air quality episodes are occurring with greater frequency and intensity, rapidly straining health infrastructure and emergency response capacity. Health systems built for stable conditions are increasingly inadequate to manage the scale and unpredictability of climate-driven health emergencies.
- Speakers stressed the urgent need to embed climate resilience into health system planning, including infrastructure design, supply chain management, workforce

training, and emergency protocols, so that health facilities and services can continue functioning when disasters strike and climate stressors intensify.

- Living conditions, poverty, urban overcrowding, and inadequate sanitation dramatically amplify the health consequences of climate change. Addressing these structural social determinants is not peripheral to climate-health policy, it is foundational to any effective prevention, preparedness, or response strategy.
- No single sector, health, environment, or disaster management, can address the complex, intersecting risks that climate change poses to public health. Outdated frameworks that separate health from climate and disaster planning must be replaced with integrated, coordinated approaches that align surveillance, response, and recovery systems across all relevant sectors.

Innovations and Good Practices

- Developing unified surveillance platforms that simultaneously monitor disease trends, water quality, and environmental parameters, such as air pollution and temperature extremes, enables early detection of climate-driven health risks.
- Designing health facilities to withstand climate hazards, through structural resilience, backup power, water security, and supply chain redundancy, combined with systematic preparedness training for health workers, ensures continuity of essential services during disasters and extreme weather events.
- Engaging communities as active participants in health preparedness, through local volunteer networks, participatory risk assessments, and community health worker training, builds last-mile resilience that formal health systems alone cannot provide. Community-based approaches ensure that prevention and response are contextually appropriate, culturally sensitive, and locally owned.

Policy Insights

- Existing public health legislation and disease surveillance systems are inadequate for the climate-health challenges now facing India. Policymakers must update legal frameworks to explicitly address climate-related health risks, and invest in integrated surveillance systems that link disease monitoring with environmental and disaster data.
- India's climate adaptation plans, disaster risk reduction frameworks, and public health policies currently operate with insufficient coordination, creating gaps in preparedness and response. A unified policy architecture, formally aligning the National Action Plan on Climate Change, National Disaster Management Plan, and National Health Mission, would ensure that climate resilience, DRR, and health system strengthening are planned and funded together, eliminating duplication and closing the critical gaps.

- Floodplains, urban slums, and climate-sensitive zones require dedicated, risk-informed health investments that reflect their disproportionate exposure and limited adaptive capacity. Financing frameworks, including Finance Commission allocations, national health missions, and international climate funds, must be calibrated to direct resources toward these high-vulnerability areas, with specific attention to strengthening primary health infrastructure, community health worker capacity, and social protection systems.

Way Forward

- India requires a dedicated national climate and health action plan that formally integrates the mandates of the Ministry of Health and Family Welfare, Ministry of Environment, Forest and Climate Change, and NDMA. This plan should define shared targets, assign institutional responsibilities, establish coordinated financing mechanisms, and create accountability systems for reducing climate-related health burdens.
- Integrated disease, water quality, and environmental surveillance systems should be systematically expanded to cover all climate-sensitive states and high-risk districts. This requires investment in digital health infrastructure, trained data managers, and real-time reporting platforms that connect district health offices with state and national early warning systems.
- A national programme to audit, retrofit, and strengthen health facilities in climate-vulnerable regions should be prioritized, ensuring that hospitals, primary health centres, and community health posts can maintain essential services during extreme weather events and disasters.
- Community health worker networks should be expanded and equipped with climate-health knowledge. Participatory preparedness programmes should be institutionalized in high-risk communities, and social protection schemes should be explicitly linked to climate vulnerability assessments, ensuring that the populations most exposed to climate-health risks are also the most supported to withstand them.

T017

Thematic : Urbanizing Hill Town Under-Climate Risks in Indian Himalayan Region
14.15 - 15.15 | Srijan

Curator: CSTEP

Panellists:

- *Dr. Sangita Kasture, Scientist G & Head Bioenergy Division, MoNRE*
- *Dr. Indu K. Murty, Sector Head, CSTEP*
- *Mr. Dinker Gurung, Architect Planner, Govt. of Sikkim*
- *Mr. Aniket Wanve, Deputy Conservator of Forest, Himachal Pradesh*
- *Mr. Ashwin Kulkarni, Partner Manager, Rainmatter Foundation*
- *Mr. Snehit Prakash , Regional Director, BORDA*
- *Dr. Rinan Shah, Postdoctoral Fellow, Queen Mary University of London*
- *Dr. Shyamasree Dasgupta, Associate Professor, IIT Mandi*
- *Dr. Aliva Nanda, Assistant Professor, IIT Mandi*

Background: Indian Himalayan Region (IHR) is reeling under the dual impacts of intensifying climate risks driven by rapid urbanization. Hill towns and other emerging urban hubs in the Himalayan states are increasingly exposed to extreme events like flash floods, including Glacial Lake Outflow Floods (GLOFs), landslides, dwindling water resources. This one hour expert roundtable aims brings together stakeholders ranging from disaster management, urban planning, climatology, hydrology, and policy to dissect these threats and forge solutions.

Key Discussion Points

- Unplanned and accelerating urban expansion across Himalayan settlements is dramatically increasing exposure to landslides, floods, glacial lake outburst floods, water stress, and infrastructure failures. Fragile slopes, expanding settlements, and overburdened drainage systems compound natural hazard risks.
- Hydrology, drainage design, and water governance emerged as central challenges for Himalayan hill towns. Urban growth disrupts natural runoff patterns, increases impervious surfaces, overloads drainage infrastructure, and intensifies slope-linked water stress and landslide risk. Simultaneously, water security and equitable access are governance challenges as much as technical ones, requiring watershed-based planning, hydrological modelling, and institutional coordination.
- Conventional urban planning models designed for plains and flatlands are fundamentally unsuitable for mountain settlements. Himalayan hill towns need

planning frameworks that are explicitly calibrated to slope dynamics, watershed boundaries, ecological carrying capacity, and local climate variability.

- Urban resilience in hill towns cannot be achieved through engineering and infrastructure alone. Effective resilience depends on institutional coordination across planning, forest, water, and disaster management departments; rights-based approaches that protect vulnerable communities from displacement and disproportionate climate risk; and inclusive governance that gives local communities a meaningful voice in planning decisions.
- No single discipline, hydrology, ecology, economics, urban planning, or engineering, holds all the answers for hill-town resilience. Effective solutions require deliberate integration of science, engineering, environmental economics, ecological governance, and community knowledge, supported by key partnerships and aligned funding ecosystems.



Innovations and Good Practices

- BORDA South Asia's approach to localized WASH solutions, including decentralized wastewater treatment, community-managed water systems, and context-specific sanitation infrastructure, offers a practical alternative to large-scale, centralized systems that are often inappropriate for hill-town topography, high construction costs, and difficult maintenance conditions.
- Integrating slope stabilization, catchment protection, forest management, and green infrastructure into urban planning provides cost-effective, co-benefit-rich alternatives to purely engineered hazard mitigation. Coordination between forest departments and urban planners, as demonstrated in Himachal Pradesh, protects natural buffers that reduce landslide risk, regulate water flows, and maintain ecological services essential for urban resilience.
- The application of hydrological modelling, runoff analysis, GIS-based risk assessment, and slope stability mapping to urban planning decisions in hill towns, as demonstrated by IIT Mandi's water resources engineering work, enables evidence-based land-use zoning, drainage design, and infrastructure siting.

Policy Insights

- Urban planning legislation and building regulations for Himalayan hill towns must be fundamentally updated to mandate climate risk assessments, watershed-based hydrological analysis, and slope stability evaluation as statutory requirements for all development approvals. Land-use zoning should explicitly restrict high-risk slopes and

drainage corridors from settlement expansion, and infrastructure design standards should be calibrated to mountain terrain and projected climate scenarios.

- Policy frameworks should formally integrate forest-urban coordination, nature-based solution standards, and catchment protection requirements into urban governance structures. Clear institutional mandates for inter-departmental coordination, across urban development, forests, water resources, and disaster management, are essential to eliminate the planning silos that currently undermine resilience in Himalayan settlements.
- Current financing frameworks for urban infrastructure are inadequate for the capital requirements and institutional complexity of climate-resilient hill-town development. Dedicated financing streams, combining central urban development funds, state disaster mitigation allocations, climate finance, and key private investment, should be aligned to support decentralized WASH systems, nature-based solutions, and terrain-sensitive infrastructure.

Way Forward

- A dedicated national effort, convening urban planners, hydrologists, ecologists, disaster managers, and state governments, should develop Himalayan hill-town specific urban planning guidelines, building codes, and land-use zoning standards.
- Each Himalayan state should establish dedicated inter-departmental planning units that integrate watershed management, forest governance, urban development, and disaster risk reduction into a single institutional framework for hill-town planning.
- Building on BORDA South Asia's demonstrated models, a systematic programme to design, finance, and implement decentralized WASH and drainage solutions across Himalayan hill towns should be developed, with state governments providing enabling frameworks and technical support for community-managed systems.
- A dedicated knowledge platform, anchored at institutions such as IIT Mandi, CSTEP, and ICARS-IIT Roorkee, should systematically document hill-town resilience case studies, modelling tools, planning innovations, and governance lessons from across the Indian Himalayan Region. This platform should serve as a resource for state planners, urban local bodies, and policymakers, facilitate peer learning between hill towns facing similar challenges.

T018	Thematic: Rethinking Land Rehabilitation in a New Normal: Land Degradation and Loss and Damage 14.15 - 15.15 Santulan
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Session Partners: WOTR & ICARS-IIT Roorkee

Panellists:

- *Prof. Anil Kumar Gupta, PI-ICARS-IIT Roorkee*
- *Dr. Marcella D'Souza, Founder Director-WOTR*
- *Mr Navin Horo, Senior Adviser, GIZ*
- *Mr Sandeep Jadhav, WOTR Consultancy Forum*

Background: The study demonstrates the urgent need to rethink disaster response in rainfed and semi-arid regions. These cascading impacts underscore the need to move beyond reactive disaster response toward integrated approaches. Beyond immediate relief, integrating Ecosystem-Based Disaster Risk Reduction (Eco-DRR) with Sustainable Land Management (SLM) could restore landscapes, rebuild livelihoods, and strengthen climate resilience. Eco-DRR also aligns closely with India's DRR priorities, global commitments and national priorities, such as Viksit Bharat 2047, by strengthening rural resilience, protecting natural resources, and improving farmers' incomes. This multistakeholder panel aims to explore how Eco-DRR with SLM can be embedded into recovery frameworks.

Key Discussion Points

- The 2025 Dharashiv flooding in Maharashtra, illustrates a systemic "poly-crisis," where compounding environmental stressors interact to produce disasters of a scale and nature that conventional single-hazard risk frameworks fail to anticipate, plan for, or adequately respond to, demanding a fundamental rethinking of how extreme events are understood and managed.
- The flooding caused severe topsoil loss, undermining the nutritional and productive capacity of agricultural land. Combined with emerging soil health challenges, such as salinity problems in Punjab and Haryana, land degradation is emerging as a slow-onset crisis that quietly erodes food security and rural livelihoods, often invisible in disaster loss assessments focused primarily on immediate infrastructure damage.
- Soil erosion and land degradation cannot be addressed in isolation, they are deeply interconnected with hydrology, climate variability, land use patterns, and human interventions across entire landscapes. Treating these as separate, localized problems leads to fragmented, ineffective responses.
- Administrative boundaries are poor proxies for ecological and hydrological systems. Effective disaster mitigation for flood and land degradation risks requires planning and

intervention at the river basin and landscape scale, crossing district and state boundaries.

- A persistent gap exists between the quality of scientific evidence on climate-land-disaster linkages and its uptake in policy and planning. Detailed field studies, GIS analyses, and ecosystem assessments are generating concrete knowledge, but this knowledge is not consistently reaching or influencing policymakers, planners, and local administrators.

Innovations and Good Practices

- The Dharashiv case study demonstrated how watershed-level analysis reveals the upstream ecological and land use drivers of downstream flooding and soil loss, insights that district-level assessments consistently miss. This approach enables more targeted, effective interventions and supports coordinated planning across jurisdictions sharing common hydrological systems.
- Combining rigorous field-based data collection with GIS-enabled spatial analysis allows precise identification of areas experiencing the highest rates of soil erosion, land degradation, and ecosystem damage. This evidence base directly supports risk-informed land use planning, targeted conservation investment, and early intervention in areas approaching critical degradation thresholds.
- Engaging local communities as active participants in land and water conservation, through practices such as contour bunding, check dams, agroforestry, and watershed management, builds resilience from the ground up. Community-led conservation uses local ecological knowledge, ensures that interventions are contextually appropriate and maintained over time, and creates a sense of ownership that sustains long-term land health



Policy Insights

- Land degradation policy must move beyond sector-specific schemes, such as soil conservation or watershed development in isolation, toward integrated landscape management frameworks that address the hydrological, ecological, and climatic dimensions of degradation together. Policies should mandate river basin-level planning, align land use regulations with disaster risk assessments.
- The gap between scientific knowledge and policy action on land degradation and climate-disaster linkages must be institutionally addressed. Governments should establish formal science-policy translation mechanisms, including mandated research uptake processes, technical advisory bodies, and regular evidence reviews.

- Community-led conservation practices that reduce soil erosion, restore watershed health, and improve land productivity should be formally recognized, resourced, and scaled within national and state policy frameworks for disaster risk reduction and climate adaptation.

Way Forward

- Building on the Dharashiv case study methodology, similar river basin and landscape-scale assessments should be systematically conducted across Maharashtra and other states with comparable agro-ecological vulnerabilities.
- A national or state-level monitoring system that tracks soil health indicators, including topsoil depth, nutrient levels, salinity, and erosion rates, alongside land use change and hydrological data should be established.
- Proven community-based conservation practices, contour bunding, check dams, agroforestry, and participatory watershed management, should be scaled across vulnerable agro-ecological zones through dedicated financing streams aligned with existing rural development and climate adaptation programmes.
- Each state should establish a dedicated platform, convening scientists, land use planners, disaster managers, agriculture departments, and community representatives, to regularly review emerging evidence on climate-land-disaster interactions and translate findings into updated policies, plans, and regulations.

T019	Thematic: Technical Papers & Case Study Session 14.15 - 15.15 Sanrakshan
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Session Curator: ICARS-IIT Roorkee

Chair:

- **Prof. Amit Dhiman, IIT Roorkee**

Co-Chair:

- **Dr. Mohit Prakash Mohanty, IIT Roorkee**

Background: The Technical Papers and Case Study Session aims to provide a structured platform for researchers, practitioners, policymakers, and young professionals to present evidence-based insights and practical experiences related to climate change adaptation, disaster risk reduction, and resilience building. The session will showcase innovative research, field-based case studies, and policy-relevant findings that demonstrate effective strategies for addressing climate risks across sectors. By bringing together diverse perspectives from academia, government, civil society, and industry, the session seeks to promote knowledge exchange and encourage interdisciplinary dialogue. The discussions will contribute to identifying scalable solutions and best practices that can support resilient development pathways at local, regional, and national levels.

Key Discussion Points

- The Indian Himalayas face particularly acute compounding impacts, disrupted water cycles, biodiversity loss, and increased hazard exposure, while urban areas contend with heat stress, air quality deterioration, and overwhelmed health systems. These multidimensional impacts demand integrated responses that simultaneously address environmental, health, and infrastructure dimensions of climate vulnerability.
- Eco-restoration, native plant species reintroduction, and watershed-based interventions emerged as essential, cost-effective strategies for building climate resilience across vulnerable landscapes. These approaches deliver multiple co-benefits, stabilizing slopes, regulating water flows, sequestering carbon, restoring biodiversity, and supporting rural livelihoods, that purely engineered solutions cannot replicate.



- Green rating systems for highways, water-sensitive design standards, and the use of low-carbon construction materials must be mainstreamed into infrastructure planning and procurement. The development of assessment tools such as the CERA Index signals growing recognition that infrastructure resilience must be measurable, comparable, and embedded in project approval and evaluation processes.
- Top-down, centrally designed interventions consistently underperform in climate-vulnerable regions, particularly in the Himalayas, where terrain complexity, cultural diversity, and institutional reach make local knowledge and community engagement indispensable. Participatory watershed management, community-driven renewable energy adoption, and locally adapted agroecological practices demonstrate that resilience built with communities.
- Bridging the gap between analytical innovation and practical application requires investing in data infrastructure, building institutional capacity to use these tools, and designing policy evaluation frameworks that demand quantifiable evidence of impact and cost-effectiveness.

Innovations and Good Practices

- The development of the CERA (Climate Impact Risk Assessment) Index is a significant methodological innovation for evaluating the sustainability, ecological sensitivity, and climate resilience of highway projects. By providing a standardized, quantifiable framework for assessing green performance across highway design, construction, and operation, CERA enables project developers, regulators, and policymakers to compare infrastructure options, identify resilience gaps, and set measurable improvement targets, moving highway sustainability assessment beyond compliance checklists toward rigorous, evidence-based evaluation aligned with climate and ecological objectives.
- The application of hempcrete combined with cow dung ash as a low-carbon, locally sourced construction material demonstrates the potential of bio-composite innovations to reduce the carbon footprint of buildings in climate-sensitive regions. These materials use locally available agricultural by-products, reduce dependence on energy-intensive conventional construction inputs, and offer thermal performance benefits suited to mountain climates.
- The implementation of participatory watershed management models that combine GIS-based spatial analysis with structured community engagement and agroecological farming practices offers a replicable, scalable approach to building landscape-level resilience.

Policy Insights

- Policy frameworks for climate adaptation in the Indian Himalayas and other vulnerable rural regions should formally prioritise nature-based solutions and community-driven approaches over large-scale engineered interventions as the default strategy.
- Policy implementation and infrastructure investment in climate-sensitive contexts must be subject to rigorous, quantifiable evaluation, including cost-benefit analysis,

performance indices such as CERA, and nexus framework assessments, to ensure that public funds deliver measurable resilience outcomes. Governments should require that all major infrastructure projects in ecologically sensitive zones undergo standardized climate risk and sustainability assessment before approval.

- Policy design must explicitly address inclusivity gaps through targeted subsidies, community-based delivery models, simplified application processes, and dedicated outreach to women, smallholder farmers, and marginalized groups, ensuring that the benefits of climate adaptation investments reach those who need them most.

Way Forward

- Building on tools like the CERA Index, a comprehensive national framework for green and climate-resilient infrastructure standards should be developed and mainstreamed across highway, building, and water infrastructure sectors in ecologically sensitive and climate-vulnerable regions. This framework should set mandatory minimum standards for carbon performance, water management, slope and drainage design, and biodiversity protection.
- A structured national programme to scale proven nature-based solutions, including eco-restoration, native species reintroduction, slope stabilization, and participatory watershed management, should be developed, with dedicated financing, technical support, and monitoring systems.
- The data-driven tools developed by researchers, GIS-based watershed models, climate-health indices, water-energy-food nexus frameworks, and econometric policy evaluation models, must be translated into operational decision-support systems embedded within planning and policy institutions at national, state, and district levels.
- The water-energy-food nexus should be formally adopted as an integrated planning framework for climate-resilient development in the Indian Himalayas and other regions facing compound resource stress. This means developing nexus assessments as a standard component of regional development planning, ensuring that decisions about water infrastructure, energy systems, and agricultural land use are evaluated for their cross-sectoral impacts and trade-offs.

T020	Thematic: The Heat Matrix: Burden, Preparedness & Solutions 14.15 - 15.15 Sankalp
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Session Partners: SMV, AIIMS Jodhpur, AIIMS Bibinagar

Panellists:

- **Dr. Pramod Kumbhar, President and CTO, Praj Industries**
- **Dr. Indu K. Murty, Sector Head- Climate, Environment and Sustainability, CSTEP**
- **Dr. Yash Joshi, Managing Partner, Aganvay Technologies**
- **Dr. Sanjukta Subudhi, Senior Fellow & Associate Director, Advanced Biofuels Division, TERI**
- **Dr. Vartika Singh, Senior Researcher, IFPRI**
- **Dr. Arun Kumar Rajora, Assistant Prof, Mody University of Science and Technology**
- **Ms. Ramya Natrajan, Research Scientist, CSTEP**
- **Ms. Rucha Phadke, Paani Foundation**
- **Ms. Kurinji Selvaraj, Research Analyst, CEEW**
- **Mr. Nitin Bajpai, Energy Vertical, NITI Aayog**

Background: Extreme temperatures are escalating health risks across India, contributing to rising mortality, disability, and inequities. Evidence from Global Burden of Disease analyses highlights substantial temperature-attributable disease burden, while implementation research reveals gaps in preparedness and stakeholder capacity. Beyond clinical response, community-based strategies, social prescribing, resilient infrastructure, and urban adaptation are critical for mitigating heat risk. Advances in AI and GIS offer predictive tools for hotspot mapping, early warning, and precision public health planning. Together, these sessions align with Vision 2047 by promoting climate-resilient health systems, digital innovation, localized adaptation, and evidence-based governance for sustainable national resilience.

Key Discussion Points

- Rising temperatures are driving significant mortality and disability across India. Evidence from the Global Burden of Disease Study 2023 reveals a sharp escalation in mortality risk beyond specific temperature thresholds, yet current HRI reporting systems systematically undercount the true burden, preventing accurate policy responses.

- Systemic notification gaps mask the real scale of temperature-attributable disease burden. Healthcare providers, community leaders, and frontline workers all have critical roles in identifying and reporting heat-related illnesses, yet field-level coordination and awareness remain persistently weak.
- Effective heat-risk management requires a multidimensional approach combining clinical response, social prescribing, indigenous practice integration, and urban infrastructure adaptation, no single intervention is sufficient to address the full spectrum of heat vulnerability.
- AI/ML-integrated GIS and remote sensing tools demonstrate strong potential for predicting climate-health risks, mapping urban heat islands, identifying pre-term birth hotspots, and supporting precision public health planning, though overfitting in vulnerability indexing models requires caution.
- All stakeholders from clinical providers to community leaders must actively engage in heat preparedness. Health system gaps, inadequate infrastructure, and poor inter-sectoral coordination are critical barriers that must be addressed through cross-sector governance frameworks.

Innovations and Good Practices

- AI/ML-based GIS systems predicting climate-health risks, including pre-term births, hospitalization surges, and urban heat island impacts, with vulnerability indexing tools enabling precision targeting of public health preparedness resources toward highest-risk populations and localities.
- Stakeholder-centric field mapping exercises documenting divergent perspectives of healthcare providers and communities on heat preparedness, generating ground-truth insights that improve the responsiveness and practical relevance of preparedness planning interventions.
- Integration of indigenous practices with social prescribing frameworks to build community-level heat-resilient infrastructure, moving beyond purely clinical responses to address social determinants of heat vulnerability at household and neighbourhood scale.



Policy Insights

- Strengthen and standardize HRI notification systems across all health facilities to provide policymakers with accurate, real-time burden data, a foundational requirement for evidence-based heat preparedness policy and targeted resource allocation.

- Mandate cross-sectoral governance frameworks enabling structured dialogue among researchers, practitioners, local officials, frontline workers, and communities to systematically identify and bridge preparedness gaps in heat emergency planning and response.
- Develop policy mandates incentivizing climate-resilient urban infrastructure and nature-based cooling solutions, green roofs, urban forests, shaded public spaces, to systematically reduce urban heat island effects and associated public health burdens.

Way Forward

- Establish nationally standardized HRI reporting and surveillance systems integrated across all health facilities, districts, and states, enabling real-time monitoring of temperature-attributable disease burden to guide dynamic preparedness responses.
- Scale AI/GIS-based heat hotspot mapping tools for use by state health departments, enabling proactive, data-driven targeting of Heat Action Plan resources and interventions toward the most vulnerable communities and geographies.
- Develop and mainstream community heat-action protocols combining indigenous knowledge, social prescribing approaches, and field-level community empowerment, ensuring preparedness extends well beyond hospital walls into households and neighbourhoods.
- Align all heat preparedness strategies explicitly with Vision 2047 goals through digital innovation, localized adaptation planning, and evidence-based multi-sectoral governance that treats heat as a chronic development risk, not just a seasonal emergency.

T022

Thematic: Climate Modelling and Risk Assessment for India 2047 15.40 - 16.40 | Srijan

Curator: UNDP, FCDO, NITI Aayog

Panellists:

- **Prof S. Sreekesh, CSRD-Jawaharlal Nehru University**
- **Shri Kirtiman Awasthi- Senior Advisor and Team Leader, GIZ**
- **Prof Angshuman Modak, IIT Bombay**
- **Dr. Anshu Sharma, Co-Founder, SEEDS**
- **Dr. David Laborde, Director, Agri-Food economics Division, FAO**
- **Ms. Eshita Gupta, Associate Director, Infrastructure and Government Services, KPMG**

Background: As climate risks intensify, integrating latest technological advances into national and state-level vulnerability and risk assessments can significantly enhance the precision, timeliness, and usability of climate information for adaptation planning. This session will explore how granular data, high resolution information and robust methods can support dynamic, data- driven assessments by combining climate projections, socio-economic datasets, and geospatial information to identify evolving risk patterns/trends. The discussion will focus on exploring robust frameworks for identifying key indicators of hazards, exposure, vulnerability, and adaptive capacity, enabling more transparent and comparable risk profiling across regions. It will also examine methods to translate global and national climate model outputs into district- and block-level actionable insights that align with state adaptation strategies and national climate priorities. A critical component of the dialogue will be assessing existing technical, institutional, and data capacity gaps within the country and identifying pathways through partnerships, digital infrastructure, and capacity building to strengthen the ability of governments to effectively utilize climate modelling outputs for informed adaptation decision-making.

Key Discussion Points

- The core challenge is not data availability but translating climate information into localized, user-specific, concrete insights. Coarse-resolution models cannot serve farmers or local administrators who need precise, location-specific data, at farm or household scale, for real drainage, stormwater, and land-use decisions.
- Vulnerability and exposure data gaps are as critical as model resolution limitations. Socio-economic indicators, gender-disaggregated data, and micro-climate variability

must be integrated alongside biophysical climate data, particularly to make the most climate-vulnerable populations visible in planning and financing decisions.

- Decades of uncoordinated, duplicated data collection across DST, institutes, NGOs, and consultancies, without long-term stewardship, has resulted in poor institutional memory, wasted resources, and datasets that cannot be compared or reliably reused for climate action planning.
- Climate information must serve two core decision spaces: local adaptation planning and governance providing appropriate local strategies; and mobilizing targeted climate finance by demonstrating how climate scenarios alter credit and financing requirements in vulnerable rural and urban economies.
- Bridging science to action remains the fundamental challenge, translating research into budgetary decisions, investable insights, and on-ground implementation requires institutional mechanisms that currently do not exist at adequate scale or coherence across India.

Innovations and Good Practices

- Gender-responsive adaptation planning tools integrating climate risk with gender-specific vulnerability layers, nature-based solutions, and micro-climate considerations, piloted in Tamil Nadu and Uttarakhand, directly linking modelling outputs to governance and planning processes at state level.
- Downstream user-oriented modelling demonstrated through a concrete use case, mango orchards with declining yield and nutritional quality, where models are tailored to a specific commodity and geography, making outputs fully usable by local farmers and administrators rather than remaining within the scientific community.
- Triple-helix collaboration model where academic institutions generate methodologies and data, governments provide use-cases and implementation pathways, and technology firms translate outputs into accessible user-friendly dashboards and decision-support tools for policymakers and local planners.



Policy Insights

- Institutionalize a standardized national climate data repository where all datasets collected by different agencies over decades are deposited, documented, and made openly accessible, ending the cycle of duplicated collection, poor stewardship, and fragmented institutional memory that currently wastes resources.

- Make vulnerable groups explicitly visible as the primary anchor of adaptation planning and financing decisions, gender, mountain communities, and micro-climate variability must drive resource allocation decisions, rather than waiting for perfect model resolution or comprehensive data coverage before acting.
- Mainstream climate adaptation indicators into large-scale national surveys such as NSS, systematically building nationwide datasets without duplicating efforts, while developing disaster-specific modular risk tools backed by national data centres under public-private partnership arrangements.

Way Forward

- Design "no-regrets" adaptation policies explicitly accounting for uncertainty and shifts in global market competitiveness, India's relative position in rice, wheat, and other commodities under climate change must inform national agriculture and trade policy alongside local adaptation strategies.
- Accelerate building of strong observational networks and high-quality ground-station data as the foundational prerequisite for both traditional climate models and AI-based tools, technology adoption must follow, not precede, data quality investment at national scale.
- Develop dynamic, high-resolution integrated risk data systems combining continuous satellite inputs with automatic ground stations, centrally stored and continuously updated, broadly accessible for real-time multi-hazard disaster risk analysis and early warning.
- Establish structured science-to-policy translation mechanisms ensuring climate modelling outputs are routinely converted into consumable budgetary, investment, and planning insights for district administrators, state governments, and national ministries, closing the persistent research-implementation gap.

T023

**Thematic: World Café - Locally Led Adaptation Practices:
Strengthening Urban Climate Resilience & DRR
15.15 - 16.15 | Sanrakshan**

Session Partner: ICLEI & ICARS-IIT Roorkee

Panellists:

- **Dr. Anil Gupta, PI, ICARS-IIT Roorkee**
- **Ms. Bedoshruti Sadhukhan, Associate Director, ICLEI South Asia**
- **Dr. Monalisa Sen, Associate Director, ICLEI South Asia**
- **Dr. Nivedita Mani, Secretary (Research and Communications), GEAG**
- **Ms. Nidhi Jamwal, Journalist**

Background: Indian cities are increasingly exposed to climate risks such as floods, heatwaves, landslides, and cyclones, intensified by rapid urbanization, population growth, and stressed infrastructure. These impacts disproportionately affect vulnerable groups including slum dwellers, women, the elderly, children, and marginalized communities. Local governments often manage both emergency response and long-term resilience planning, yet conventional approaches frequently overlook local knowledge and community priorities. Limited capacity within municipal institutions further constrains inclusive climate action. Locally Led Adaptation (LLA) offers a transformative approach by empowering local governments and communities as decision-makers. The session aims to explore how Indian cities can operationalize LLA within existing governance frameworks to strengthen urban climate resilience and disaster risk reduction.

Key Discussion Points

- Despite decades of discourse, LLA is not operational in most Indian cities. Three critical barriers persist, absence of foresight about how cities will grow, lack of willingness within city administrations to self-initiate adaptation, and insufficient institutional capacity. Importantly, finances are rarely the real constraint; the deeper problem is not knowing what to do and lacking political intent to act without external pressure or crisis.
- 74th Constitutional Amendment, has not translated into genuine devolution of decision-making powers to municipal corporations, ward committees, or community levels, except in a few states. Without real power at the local level, locally led adaptation remains structurally impossible.
- Communities across India, from flood-prone Bihar to coastal Odisha and the Himalayas, are already adapting through indigenous crop varieties, traditional water management, and locally evolved coping strategies. The flood-resilient Desaria Dhan

rice variety in Saharsa, Bihar, cultivated for generations by Musahar communities, exemplifies adaptation that is invisible to policy because it is not recognized as such. This lab-to-land gap systematically excludes the most contextually appropriate solutions from national frameworks.

- Policies claiming to promote equity consistently fail to include disadvantaged communities, Dalits, Adivasis, women, persons with disabilities, in meaningful stakeholder consultations. Even within communities, disparities in voice and representation mean adaptation plans reflect dominant groups' priorities. Urban areas face particular challenges, weak community cohesion, heterogeneous populations, and organizational rather than genuinely community-driven initiatives mean that LLA in cities is typically led by NGOs or individual champions rather than communities themselves.
- Effective LLA requires urban local bodies, development authorities, line departments, and panchayats to coordinate, but institutional silos prevent this. Additionally, urban adaptation is incomplete without integrating surrounding peri-urban and rural areas, resource flows, market linkages, and ecological services connect urban and rural systems in ways that administrative boundaries ignore.

Innovations and Good Practices

- ICLEI South Asia's development of risk-informed Gram Panchayat Development Plan SOPs, training manuals, and strategic documents, implemented across six states including UP, Maharashtra, Rajasthan, and Tamil Nadu, represents a replicable innovation for embedding LLA into existing bottom-up planning processes. By integrating community self-assessment of local climate risks into the mandatory five-step GPDP process, this approach uses existing institutional infrastructure rather than creating parallel systems, making LLA systematically part of rural development planning without requiring new frameworks.
- ICLEI's Rockefeller Foundation-supported project mapping ward-level vulnerabilities in Indian cities, capturing differences between low-lying, upland, affluent, and marginalized wards, disaggregated by gender and social inclusion dimensions, demonstrates a practical methodology for making LLA meaningful in urban contexts.
- The Phaydemand Shauchalaya ecologically designed toilet in flood-prone North Bihar, elevated to withstand seasonal inundation, designed to separate waste for community reuse, built by trained local women masons, illustrates how locally adapted solutions can simultaneously address climate resilience, sanitation, and green livelihoods.



Policy Insights

- Policy must implement the 74th Amendment's intent by formally devolving climate planning powers and resources to ward committees and urban local bodies, with legally mandated community participation in vulnerability assessment, city climate action plans, and adaptation budget allocation. Participatory processes should include gender-disaggregated consultations, ensuring marginalized groups have formal representation.
- Existing adaptation policies lack equity benchmarks, making it impossible to assess whether they are reaching the most vulnerable. All national and state adaptation frameworks should mandate equity audits, assessing current policies against inclusivity benchmarks and identifying gaps, and set measurable, time-bound targets for inclusive participation, benefit distribution, and representation of marginalized groups.
- A policy mechanism to formally identify, document, and validate community adaptation practices, including traditional crop varieties, water management systems, and ecological knowledge, as legitimate adaptation interventions should be established. Traditional ecological knowledge registers being developed in several states should be digitized, standardized, and linked to national adaptation planning databases, preventing the continued loss of invaluable locally evolved resilience knowledge.

Way Forward

- National effort to document, validate, and package locally led adaptation models, differentiated by city typology including mountain towns, coastal cities, dryland cities, and flood-prone regions, should be undertaken, drawing on existing good practices from ICLEI, GEAG, and partner organizations
- Formal partnership frameworks, mandating collaboration between municipal corporations, NGOs, community organizations, research institutions, and private sector actors in city climate action planning, should be established at state and national levels.
- In urban areas, city climate action plans should adopt ward-level vulnerability mapping as a mandatory baseline, with gender-disaggregated data collection and ward committee participation formally required. Convergence between GDPs, District Disaster Management Plans, and city climate plans should be institutionalized to eliminate planning fragmentation across rural-urban boundaries.
- Training programmes should explicitly build understanding of local climate vulnerabilities, equity principles, and community engagement methodologies, addressing the intent and behavior gaps identified as primary barriers to LLA. Communication skills, translating complex climate concepts into accessible language for community engagement, should be a core component of all LLA capacity building.

T024	Thematic: Emerging Opportunities and Innovations for Reducing Loss and Damage 15.15 - 16.15 Sankalp
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Session Partners: CDRI & ICARS-IIT Roorkee

Panellists:

- **Prof. Vinod Sharma, Vice Chairman-SSDMA**
- **Mr. Sarbjit Singh Sahota, DRR Specialist, UNICEF**
- **Ms. Raina Singh, Lead Specialist, Capacity Development, CDRI**
- **Dr. Ratnesh Kumar, Lead Specialist, Knowledge Management, CDRI**
- **Ms. Tania Banerjee, Associate Director, BCG**
- **Ms. Aishwarya Raj, Senior Specialist, GIR Report 2025, CDRI**
- **Mr. Nilesh Maiti, Consultant, View of Risk advisory, Aon Reinsurance**

Background: Climate change and disasters are intensifying global concerns on Loss and Damage (L&D), particularly for developing countries facing high climate risks and limited recovery resources. Disasters caused nearly USD 2.97 trillion in global losses between 2000–2019, with climate hazards dominating events. Infrastructure failures often trigger cascading economic and social disruptions.

The Coalition for Disaster Resilient Infrastructure's *Global Infrastructure Resilience Report (GIR 2025)* builds on earlier work by linking infrastructure risk with financial, technological, and ecological resilience pathways. This session will highlight GIR 2025 insights and discuss policy and innovation pathways to reduce loss and damage through resilient infrastructure systems.

Key Discussion Points

- Global infrastructure losses are estimated at USD 700–834 billion annually and could rise 30–60% without resilience integration, making proactive infrastructure investment a compelling economic imperative, not just an environmental or humanitarian obligation.
- Indirect business losses from infrastructure disruptions are 7–16 times higher than direct physical damages. MSMEs are disproportionately affected due to limited business continuity planning, insufficient insurance coverage, and low uptake of parametric and catastrophe risk instruments.

- Layered financing approaches, combining insurance, catastrophe bonds, blended finance, and public funding, are essential to bridge growing infrastructure resilience financing gaps that no single financial instrument can adequately address alone.
- Over 35 technologies ranging from basic digital tools to advanced AI have been identified as cost-effective for improving infrastructure connectivity, monitoring, and asset performance, yet nature-based solutions require improved financing mechanisms and procurement reforms for large-scale adoption.
- Rapid and complete reconstruction significantly reduces indirect economic losses compared to delayed recovery. Capacity building must therefore focus on subnational and grassroots implementers, with practical, context-specific training drawing from scalable developing-country case studies.

Innovations and Good Practices

- GIRI (Global Infrastructure Resilience Index) open-access probabilistic risk assessment platform covering multiple hazards, earthquakes, floods, droughts, providing Average Annual Loss metrics and financial risk data as a global public good for policymakers and infrastructure investors.
- AI and digital tools for real-time infrastructure monitoring, performance optimization, and risk-informed decision-making, with over 35 cost-effective technologies identified across sectors as immediately deployable for improving infrastructure resilience without prohibitive capital investment.
- Scalable nature-based infrastructure solutions supported by structured community participation, local stewardship models, procurement reforms, and technical capacity building, demonstrated as viable alternatives or complements to hard engineering approaches in multiple country contexts.



Policy Insights

- Integrate mandatory resilience metrics and assessments into all new infrastructure investment frameworks, planning approvals, and public procurement processes, resilience must be a design requirement from the outset, not a retrofitted addition after construction.

- Promote layered financing mechanisms combining public investment, private insurance, parametric instruments, and blended finance to ensure comprehensive infrastructure risk coverage, particularly for MSMEs and subnational governments with limited fiscal capacity.
- Strengthen institutional coordination and governance across governments, financial bodies, and communities to overcome the chronic underinvestment in infrastructure maintenance, retrofitting, and capacity building that amplifies indirect economic losses from disasters.

Way Forward

- Scale GIRI and similar open-access risk tools to inform infrastructure investment decisions systematically across national and subnational planning frameworks, making probabilistic risk assessment a standard input in development planning.
- Develop context-specific, practical capacity-building programmes for local and subnational infrastructure implementers, explicitly drawing on scalable lessons from developing-country case studies rather than importing high-income-country models.
- Establish clear policy incentives for nature-based infrastructure solutions including procurement reform, technical assistance, and community engagement support, enabling large-scale adoption beyond pilot projects.
- Move from compliance-oriented to resilience-oriented infrastructure governance, embedding data-driven, inclusive, and adaptive strategies into long-term national and subnational planning systems as standard practice.

T025	Thematic session : Water Standardization and Policy Integration: Sustainable National Development under Climate Change 16.25 - 17.25 Srijan
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Curator: IIT Indore, BIS & ICARS-IIT Roorkee

Panellists:

- **Prof. Manish Goyal, IIT Indore**
- **Dr. Ratnika Singh, BIS**
- **Dr. Pritee Sharma, IIT Indore**

Background: India's water sector suffers from fragmented policies, inconsistent standards, and limited institutional coordination across supply, wastewater, groundwater, and reuse systems, undermining efficiency, public health, and sustainability. Addressing this fragmentation is critical to national and global resilience agendas, where water security directly impacts climate adaptation, disaster risk, and economic productivity. This session proposes integrating national water policies with standardized technical, regulatory, and performance benchmarks, supported by digital monitoring and stronger enforcement mechanisms. It aligns with Vision 2047 by advancing evidence-based governance, harmonized water standards, and sustainable resource management, contributing directly to the Summit objectives of systemic, governance-driven resilience.

Key Discussion Points

- Water standards must evolve from static quality limits to dynamic, risk-driven management frameworks explicitly accounting for climate stressors, saltwater intrusion, erratic rainfall, floods, and droughts, that increasingly render fixed-point monitoring frameworks inadequate for real-world water management.
- BIS's new Environment and Ecology Divisional Council (ETDC), established in 2024, signals a significant institutional policy shift toward treating environment and ecology as core pillars of India's national standardization architecture, not peripheral technical concerns.
- Standardization of water reuse, treated STP water for gardening, centralized AC, agriculture, and toilet flushing, is urgently needed, with scientifically grounded, publicly communicated BOD/COD safety thresholds to overcome widespread public hesitancy and health concerns.
- "Crisis" in water supply is now formally defined by emerging BIS frameworks as any service disruption exceeding 36 hours, providing utilities a structured protocol framework for maintaining continuity and accountability during supply emergencies and extreme weather events.

- India's engagement at ISO/IEC levels must strategically balance alignment with international best practices while asserting India's specific geographical, economic, and infrastructure realities, ensuring global standards reflect diverse developing-country water management contexts.

Innovations and Good Practices

- Adoption of three specific international water reuse standards for urban areas through BIS, promoting circular economy practices and enabling safe, regulated reuse of treated wastewater across multiple urban applications and industrial sectors.
- Development of dedicated mobile toilet management standards, significantly improving temporary sanitation service delivery standards in disaster response, mass events, and rural settings where permanent sanitation infrastructure is absent.
- Stakeholder-driven standards development process enabling any individual or organization to formally propose New Work Items, ensuring BIS frameworks remain dynamically responsive to emerging water management challenges and frontline practitioner needs.

Policy Insights

- Mandate a national policy shift from fixed-point water quality monitoring to risk-driven, adaptive management systems that account for increasing hydrological variability and climate-induced disruptions to water supply and quality.
- Develop mandatory, structured water audit standards across all utilities, enabling systematic performance benchmarking, informed resource management decisions, and transparent public accountability for water service delivery.
- Fast-track clear national guidelines specifying BOD, COD, and suspended solids thresholds for safe reuse of treated STP wastewater, overcoming public hesitancy through transparent, accessible scientific communication and peer-country precedent.



Way Forward

- Integrate evolving BIS water reuse and crisis management standards into urban planning frameworks, industrial operating licenses, and water utility regulatory requirements aligned with India's Vision 2047 development goals.
- Expand water reuse infrastructure frameworks to address high-demand industrial applications, centralized AC systems, process cooling, and toilet flushing, developing

formal Indian guidelines informed by comparable international regulatory frameworks.

- Strengthen India's proactive engagement at ISO/IEC to advocate for standards that reflect Indian geographic, climatic, and economic conditions, ensuring global water standards serve developing-country realities alongside high-income contexts.
- Build public awareness and institutional confidence in treated water reuse safety through transparent science communication, demonstrated case studies, and progressive regulatory frameworks that enable gradual adoption across urban and industrial sectors.

T026

Thematic : Technical Papers & Case Study Session
16.25 - 17.25 | Sanrakshan

Session Curator: ICARS-IIT Roorkee

Chair:

- **Prof. P.K. Joshi, SES, Jawaharlal Nehru University**

Co-Chair:

- **Prof. Rajarshi Dasgupta, SPP, IIT Delhi**

Background: The Technical Papers and Case Study Session aims to provide a structured platform for researchers, practitioners, policymakers, and young professionals to present evidence-based insights and practical experiences related to climate change adaptation, disaster risk reduction, and resilience building. The session will showcase innovative research, field-based case studies, and policy-relevant findings that demonstrate effective strategies for addressing climate risks across sectors. By bringing together diverse perspectives from academia, government, civil society, and industry, the session seeks to promote knowledge exchange and encourage interdisciplinary dialogue. The discussions will contribute to identifying scalable solutions and best practices that can support resilient development pathways at local, regional, and national levels.

Key Discussion Points

- Evidence from the Global Burden of Disease study confirms strong associations between heat exposure and cardiovascular and respiratory non-communicable diseases. These compounding health impacts are straining healthcare systems, exposing governance gaps, and disproportionately affecting vulnerable populations, demanding urgent integration of climate considerations into public health planning, surveillance systems, and institutional response frameworks at national and state levels.
- The cross-sectional study from West Bengal demonstrated significant correlations between maternal heat exposure during pregnancy and adverse fetal outcomes including low birth weight and preterm birth. Targeted public health interventions, climate-sensitive antenatal care protocols, and community-level awareness programmes are urgently needed to protect pregnant women, particularly in low-income and heat-exposed settings across India.
- A 25-year analysis of heatwave disaster data across Asia revealed a clear upward trend in heat event frequency, duration, and associated mortality. Healthcare systems are

experiencing increasing strain from prolonged extreme heat, with vulnerable populations, the elderly, outdoor workers, urban poor, and those with pre-existing conditions, facing the highest risks.

- The case study of Chakhensang tribes in Nagaland documented sophisticated traditional knowledge systems, community land use practices, and forest management approaches that simultaneously sustain livelihoods and ecological balance. These indigenous adaptive strategies, built over generations, demonstrate resilience outcomes that formal governance frameworks have struggled to achieve.
- The decadal analysis of digital health-seeking behavior in India using Google search data and SARIMA time-series modelling validated infodemiology as a powerful, low-cost tool for real-time disease surveillance and early warning. By detecting shifts in health-related search trends before formal case reporting systems capture them, these digital approaches enable faster public health response.

Innovations and Good Practices

- The application of infodemiology, using Google search trend analysis validated through SARIMA time-series modelling, to national bio-surveillance is a significant methodological innovation for climate-health preparedness. This approach uses freely available digital data to detect disease patterns and predict health events in near real-time, at a fraction of the cost of conventional surveillance systems. Its demonstrated effectiveness over a decade of Indian health data makes it a immediately scalable tool for strengthening national early warning capacity for climate-induced disease events.
- The Chakhensang tribal model of community-based land use and forest management in Nagaland demonstrates a replicable good practice for integrating indigenous knowledge systems into formal climate adaptation frameworks. Their resource-sharing practices, traditional ecological knowledge, and adaptive land management strategies deliver measurable outcomes in livelihood security, biodiversity conservation, and community resilience, without large-scale external investment.
- The South Delhi community study's approach, quantifying the association between heat-related illnesses and quality of life across socio-demographic groups, provides a rigorous, community-grounded evidence base for designing targeted urban heat action plans. Combined with community engagement and heat preparedness



awareness, this approach offers a practical model for urban health resilience applicable across India's heat-stressed cities.

Policy Insights

- Existing public health governance frameworks in India do not adequately account for the accelerating health risks of climate change, including heat stress, shifting disease vectors, and air quality impacts. Policy must explicitly embed climate risk assessment into health system planning, hospital preparedness standards, and public health legislation.
- Evidence of heat stress impacts on maternal and fetal health, non-communicable disease burdens, and quality of life among urban adults demands targeted policy responses that go beyond general heat advisories. National and state health policies should mandate climate-sensitive antenatal care protocols, establish heat vulnerability indices for communities, and design targeted interventions for high-risk groups, pregnant women, the elderly, outdoor workers, and urban poor.
- The Ministry of Health and Family Welfare should establish protocols for systematically incorporating digital surveillance data alongside conventional epidemiological reporting, invest in the technical infrastructure and capacity needed to implement these tools at scale, and develop guidelines for using infodemiology outputs to trigger early public health preparedness responses.

Way Forward

- India should develop a unified climate-health surveillance platform that integrates digital infodemiology tools, conventional disease reporting systems, meteorological data, and environmental health indicators into a single early warning architecture.
- Current heat action plans in Indian cities focus primarily on mortality prevention among the elderly and outdoor workers. These plans must be expanded and updated to explicitly address maternal heat exposure risks during pregnancy, the exacerbation of non-communicable diseases by heat stress, and the quality-of-life and mental health impacts documented in community studies.
- A national repository of community-based resilience practices should be developed, facilitating knowledge exchange across states and communities. Integration of indigenous approaches into Joint Forest Management, watershed development programmes, and climate adaptation plans would use these proven strategies at greater scale.
- Closing the gap between climate-health research and policy application requires sustained investment in interdisciplinary research programmes that connect epidemiology, climate science, public health, and social science. Medical colleges, public health institutions, and disaster management bodies should jointly develop climate-health training curricula for health workers, equipping the frontline workforce to recognize, respond to, and report climate-induced health impacts.

T027

Thematic session: AI for All in DRR: Ethical and Community Centric Resilience

16.25 - 17.25 | Santulan

Session Partners: RIKA India

Speakers:

- **Air Marshal. A. K. Arora (Retd.), Indian Air Force**
- **Dr. Shekhar Kuriakose, Member Secretary, KSDMA and Head, Scientist-State Emergency Operations Centre, Govt. of Kerala**
- **Dr. Sangeeta Garg, Head Research & Innovation, IHFC, IIT Delhi**
- **Dr. Sarat Kumar Das, State Project Officer, Govt. of Tripura**
- **Dr. Ranit Chatterjee, Co-Founder, RIKA**
- **Dr. Kaushik Das, TCS – Research**
- **Dr. Aditi Singh, Program Manager, RIKA India**

Background: The session addresses the challenge that unequal access to data, technology, and technical capacity may widen vulnerabilities despite advances in Artificial Intelligence for disaster risk assessment, early warning, and recovery. It supports global priorities under the Sendai Framework for Disaster Risk Reduction, promoting strengthened capacities and risk-informed decision-making. The session contributes to the Vision 2047 objective of building a developed India through technological advancement, effective governance, inclusive growth, and sustainable development by promoting accessible, ethical, and community-centered applications of AI for resilience.

Key Discussion Points

- Artificial intelligence, through predictive analytics, early warning systems, flood forecasting, and real-time damage assessment, is transforming disaster management from post-event response toward anticipatory risk reduction. By enabling faster, more accurate risk identification and better pre-disaster planning, AI applications offer State Disaster Management Authorities and local institutions the tools to act before disasters strike rather than after
- Many disaster impacts, particularly losses in informal sectors, intangible damages, and community-level disruptions, remain unrecorded in existing datasets. The absence of standardized, comprehensive, and AI-ready damage and loss databases at state and national levels severely limits the accuracy, reliability, and scalability of AI-based disaster solutions.

- The combination of AI software with drones, robots, and wearable technologies is enabling practical, field-level disaster response capabilities, including remote reconnaissance, search and rescue support, and real-time situational awareness in inaccessible or dangerous environments
- Despite significant technological progress, AI solutions for disaster management remain largely inaccessible to the local governments, community organizations, and frontline responders who need them most. High costs, technical complexity, limited local language support, and insufficient industry incentives to serve lower-income or geographically remote markets create deep adoption gaps.
- The deployment of AI in high-stakes disaster management decisions, early warnings, damage assessments, resource allocation, raises significant ethical concerns around algorithmic bias, transparency, and accountability. AI systems trained on incomplete or unrepresentative datasets risk producing outputs that systematically disadvantage already vulnerable populations.

Innovations and Good Practices

- The application of generative AI for administrative functions, including automated report drafting, multilingual translation, and document processing in government disaster management workflows, offers an immediately practical, low-barrier entry point for AI adoption in public institutions. This use case requires less specialized data infrastructure than predictive modelling, delivers tangible efficiency gains for overstretched disaster management administrations, and builds institutional familiarity with AI tools.
- The integration of AI-powered drones, ground robots, and wearable technologies for real-time reconnaissance, damage mapping, and remote field operations is a significant practical innovation for disaster response in inaccessible and high-risk environments. These hardware-software systems enable faster situational awareness, reduce risks to human responders, and generate the real-time spatial data needed for accurate damage assessment and resource deployment decisions.
- The approach of beginning with hyper-local, user-driven AI pilots, incorporating on-ground user feedback, local context data, and low-cost use cases before scaling, addresses one of the most persistent failure modes of technology deployment in disaster management: solutions designed without adequate understanding of end-user needs and local conditions.



Policy Insights

- National and state governments must prioritise the development of standardized, comprehensive, and interoperable disaster loss and damage databases as foundational infrastructure for AI-enabled disaster risk reduction. Clear data governance standards, mandatory reporting protocols for all disaster events, and dedicated institutional capacity for data management are essential prerequisites for reliable, scalable AI applications in Indian disaster management systems.
- Governments must develop and enforce governance frameworks specifically addressing the ethical deployment of AI in disaster risk reduction, covering algorithmic transparency, bias auditing, accountability mechanisms, and human oversight requirements for AI-driven decisions.
- Scaling AI for disaster resilience across India's diverse and resource-constrained contexts requires deliberate public-private partnership frameworks that create viable market incentives for industry to develop affordable, locally relevant solutions. Governments should design procurement models, challenge grants, and co-development programmes that engage technology companies, startups, and research institutions in building AI tools calibrated for local language, data environments, institutional capacity, and affordability constraints.

Way Forward

- A coordinated national programme to develop AI-ready disaster data infrastructure should be launched, establishing standardized data collection protocols, interoperable databases, and data-sharing frameworks across NDMA, SDMA, and sectoral ministries. This infrastructure should systematically capture losses in informal sectors and intangible impacts currently absent from datasets, integrate satellite, sensor, and community-reported data streams, and be maintained as a continuously updated national resource.
- A dedicated national centre, potentially anchored within IHFC or a similar innovation institution, should be established to coordinate AI research, development, and deployment for disaster management across India. This centre should facilitate co-development of solutions between SDMA, research institutions, and technology companies; manage a portfolio of state-level pilots; provide technical assistance and capacity building to disaster management authorities; and serve as a knowledge hub.
- Systematic capacity building programmes should be developed and delivered across NDMA, SDMA, DDMA, and frontline disaster management institutions to build AI literacy, data management skills, and practical competence in deploying and interpreting AI tools. These programmes should be tiered, from foundational AI awareness for senior administrators to technical training for data and operations staff, and should emphasize hands-on learning with tools relevant to each institution's specific disaster risk context.

C3

Parisamvaad: Water Sustainability Promotion through Youth Engagement

14.15 - 15.15 | Parisamvaad Area

Session Partners: Youth4Water & ICARS-IIT Roorkee

Speakers:

- **Grp. Capt. Rashmi Dimri, Metrological Officer, DRDO-DGRE**
- **Dr. Ranjan Kishor Panda, Youth4Water India**
- **Dr. Manoranjan Behera, AJSA India**
- **Prof. Deeksha Katiyal, GGSIPU**

Background: This session highlights the need to engage and empower youth in strengthening water and climate resilience, particularly in coastal regions increasingly exposed to cyclones, storm surges, floods, and sea-level rise. Despite various initiatives, youth participation often remains fragmented and lacks sustained platforms for capacity building and leadership. The session will explore how initiatives such as *Youth4Water-India* can connect young people with climate action, enhance their knowledge and skills, and promote youth-led community resilience. Engaging youth supports national and global climate agendas by strengthening environmental stewardship and community adaptation. It aligns with Vision 2047 by nurturing informed young leaders who drive sustainable development and resilience.

Key Discussion Points

- With 1.2 billion young people globally between ages 15-24, India's largest demographic asset, youth must be repositioned from passive beneficiaries to active partners in resilience building. Meaningfully engaging even 10% of this population in climate action could create the largest resilience force in human history, yet their participation in formal planning processes remains critically limited.
- A systematic study across thousands of students in India and globally revealed alarming disconnection, urban youth believe water comes from taps and bottles, while rural youth are losing traditional relationships with water bodies. This knowledge gap, created by inadequate education, absent community engagement, and normalized water scarcity, is a foundational resilience risk for India's future.
- Rainfall patterns are shifting dramatically, longer dry spells, extreme short-duration precipitation events, erratic monsoons, and unpredictable cyclones are already reshaping agriculture, energy, and urban planning. Yet meteorology, water science, and climate literacy are virtually absent from school curricula.

- Development programs, schools, infrastructure, livelihood schemes, built without integrating disaster risk are repeatedly destroyed and rebuilt at enormous cost. A cyclone-resilient school costs marginally more to build but saves vastly more over time. Similarly, youth-focused livelihood programs in drought-prone areas that ignore irrigation and water scarcity push educated graduates into migration and urban slums.
- India currently has negligible water-related start-ups and almost no "waterpreneur" ecosystem, despite facing acute water stress. Industries disproportionately direct research partnerships, funding, and recruitment toward premier institutions, bypassing the majority of students in state universities and government colleges. HCL Tech's 31x water-positive status and competitive grant programme for water innovation demonstrate that corporate responsibility for water governance is both viable and effective.

Innovations and Good Practices

- The Youth for Water India campaign, mentored by experienced practitioners and water experts, represents an innovative model for systematically channelling youth energy toward meaningful climate and water resilience action. Moving beyond standalone activities like tree planting and plastic collection, the campaign aims to build youth understanding of interconnected ecological systems, water, forests, mountains, agriculture, atmosphere, and develop structured pathways.
- HCL Tech's introduction of an "aquapreneur" database and global investment in water entrepreneurship ecosystems signals a corporate approach that goes beyond compliance toward key investment in water innovation. This model offers a template for engaging India's technology industry in building the water resilience infrastructure and entrepreneurship ecosystem that government programmes alone cannot create.
- The suggestion to create structured pathways for graduate and postgraduate students to visit schools and communicate water science, remote sensing applications, GIS-based vulnerability mapping, and meteorological knowledge directly to younger students represents a high-impact, low-cost innovation in science communication. Evidence consistently shows that student-to-student communication produces stronger learning outcomes and behavioural change than top-down expert communication.

Policy Insights

- Water science, meteorology, climate literacy, and environmental management must be formally incorporated as mandatory subjects at school and university levels, not as optional electives or minor components of science syllabi. Curriculum revision should be undertaken in genuine partnership between universities and industry, with

companies clearly communicating the competencies they require so that academic programmes produce graduates equipped for the emerging environmental sector.

- A critical policy gap exists in the protection of civil defense volunteers, Aapda Mitras, and community responders deployed in disaster zones. Formalizing volunteer roles within village disaster management plans, GPDP processes, and local climate action planning would simultaneously protect volunteers and ensure their meaningful, recognized participation in community resilience systems.
- Village Disaster Management Plans and Gram Panchayat Development Plans are being prepared with limited youth engagement, existing largely as paper exercises unknown to 90% of community members. Policy must mandate structured youth participation in VDMP preparation, local climate action planning, and community risk mapping, treating youth as co-designers rather than beneficiaries.

Way Forward

- A structured national programme should be developed to systematically build climate, water, and meteorological literacy among Indian youth, spanning school curriculum reform, university course redesign, peer-to-peer science communication initiatives, and community-based water stewardship programmes. This programme should be anchored within existing frameworks, National Education Policy implementation, Jal Jeevan Mission, and NDMA youth engagement initiatives.
- India's near-zero water start-up ecosystem, despite acute and worsening water stress, represents both a critical gap and a significant opportunity. A dedicated national programme to cultivate "waterpreneur" culture should be developed, combining competitive grant funding, incubation support, university-industry partnerships, and public procurement commitments for water innovation.
- Every major development programme, school construction, rural livelihood schemes, agricultural support, urban infrastructure, must be required to integrate disaster risk assessment and climate adaptation from the design stage. A national policy framework mandating risk-informed development planning, developed jointly by NDMA, NITI Aayog, and sectoral ministries, would systematically eliminate the costly cycle of building and rebuilding without resilience.
- Structured convergence platforms, modelled on RESSUMMIT's multi-stakeholder design but specifically focused on youth engagement and water sustainability, should be established at state and national levels, with clear mandates to translate dialogue into collaborative programmes, shared research agendas, and measurable community-level outcomes.



C4

Parisamvaad: Systems for Long-term Well Being: Mental Health & Psychological Resilience

15.15 - 16.15 | Parisamvaad Area

Session Partners: AOEH, ICARS-IITR, KIIT

Speakers:

- **Dr. OP Jhirwal, IHBAS**
- **Dr. Amod Kumar, Assistant Professor, Delhi University**
- **Shri Vidya Bhushan Rawat, Social Worker & Human Rights Activist**
- **Dr. Ashish Mittal, Psychiatrist**

Background: Mental health and psychological well-being are increasingly recognized as critical components of resilience in the face of disasters, climate change, and social disruptions. Communities exposed to repeated shocks such as extreme weather events, displacement, and economic stress often experience long-term psychological impacts, including anxiety, trauma, and depression. However, mental health support systems remain underdeveloped and are rarely integrated into disaster preparedness and recovery frameworks. Strengthening systems for long-term well-being requires integrating mental health services into public health, disaster risk reduction, and community resilience strategies. This session will explore approaches for building psychological resilience, improving access to mental health support, and promoting community-based well-being systems.

Key Discussion Points

- Despite decades of disaster response experience, mental health remains an afterthought in India's disaster management frameworks. The absence of mental health infrastructure at district and block levels means communities, particularly marginalized ones, receive no psychological support during or after disasters, deepening trauma and undermining long-term recovery and resilience.
- Communities living on riverbanks and coastal areas face repeated annual displacement from floods and cyclones with zero psychological support. The absence of mental health professionals at village level drives communities toward faith healers and tantric practitioners. It is a rational response to institutional failure. Women in these communities bear disproportionate psychological burden, facing violence, shame, and social exclusion after disasters, normalized by structural insensitivity in administrative and health systems.
- Administrative responders consistently handle disaster-affected communities with institutional arrogance rather than sensitivity, particularly in marginalized

communities. Women's mental distress post-disaster is routinely dismissed as madness rather than recognized as trauma, leading to social exclusion and violence.

- The three-L framework of Psychological First Aid (Look, Listen, Link), developed and being rolled out through NIDM and NCDC across Uttarakhand, Rajasthan, Gujarat, Bihar, and Jharkhand, provides a simple, trainable protocol anyone can apply. It requires no clinical expertise, can be delivered at panchayat level, and creates a first-response layer that identifies distress, provides comfort, and connects individuals to professionals, dramatically reducing the gap between need and care in disaster-affected communities.
- Dr. Kishor's advocacy for Salutogenic Community Medicine shifts the approach toward generating health, asking how communities stay healthy, draw on traditional knowledge, build social bonds, and sustain psychological wellbeing.

Innovations and Good Practices

- India's District Mental Health Programme, combined with the national Psychological First Aid training initiative delivered through NIDM and NCDC, represents a concrete, scalable innovation for building community-level mental health response capacity. By training district and block managers, healthcare workers, and community volunteers in the Look-Listen-Link framework, the programme creates a decentralized first-response layer for psychological support.
- Emerging AI applications for mental health offer two significant innovations, faster triage connecting distressed individuals to appropriate professionals, replacing inefficient "doctor shopping," and passive monitoring tools that track behavioural indicators of psychiatric conditions such as bipolar disorder.
- Communities possess their own mental health coping strategies built over generations, yet these remain undocumented and excluded from formal frameworks. Creating structured documentation processes and bringing civil society activists from villages into policy forums, as practiced at RESSUMMIT, bridges this critical knowledge gap.

Policy Insights

- The near-total absence of psychiatrists and clinical psychologists at district level, constitutes a structural failure of the welfare policy. Policy must mandate deployment of mental health professionals at district hospitals and trained psycho-paramedics at PHC and CHC levels.
- All disaster management training, for collectors, police officers, NDRF/SDRF personnel, and community volunteers, must include modules on psychological first aid, gender-sensitive response, and caste-sensitive engagement with marginalized communities. Embedding sensitivity training within disaster management curricula at NIDM, SDMA, and all DM training institutions would systematically build a more humane and effective response workforce.

- Following the model of COVID-19 pandemic modules integrated into medical and nursing curricula by the National Medical Commission, mental health components must be embedded across all educational levels, from school to undergraduate and postgraduate programmes, with experiential learning rather than purely academic content. Community medicine programmes should formally adopt salutogenic frameworks, focusing on health generation alongside disease prevention, particularly targeting adolescents in climate-vulnerable and marginalized communities.

Way Forward

- A dedicated community psycho-paramedic cadre, trained in Psychological First Aid, gender and caste sensitivity, and basic mental health identification and referral, should be formally created and deployed at panchayat level across climate-vulnerable districts. Drawing on existing community health worker infrastructure such as ASHA workers and Aapda Mitras, and building on NIDM's state-by-state PFA rollout, this cadre would provide the last-mile mental health response layer.
- The ongoing PFA training programme, currently covering Uttarakhand, Rajasthan, Gujarat, Bihar, and Jharkhand, must be accelerated to cover all remaining states, with training delivered at district and block levels and integrated into District Disaster Management Plans as a mandatory preparedness component. Collectors and block officers should be trained alongside health workers, ensuring administrative leadership understands and actively supports mental health response.
- A systematic national programme to document traditional coping mechanisms, community mental health practices, and indigenous resilience strategies, particularly among vulnerable social groups, should be developed in partnership with civil society organizations working at grassroots level. This documentation should inform the design of culturally appropriate mental health interventions and be formally incorporated into community disaster preparedness programmes.
- RESSUMMIT's multi-stakeholder model should be formally extended to include village-level civil society activists, community health workers, and representatives of marginalized communities as substantive participants, not just observers, in resilience policy dialogue. This convergence model, institutionalized across national and state disaster management planning processes, would close the persistent gap between policy intent and community experience.

P029	Concluding and Way Forward 17.25 - 18.15 Main Hall
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Session Partners: NITI

Speakers:

- **Dr. Afroz Ahmad, Hon'ble Member-NGT**
- **Dr. Andre Lindner, Director-ABCD Centre, TU Dresden**
- **Dr. Anshu Sharma, Co-Founder, SEEDS India**
- **Prof. Anil K. Gupta, Professor, WRDM-IIT Roorkee and PI-ICARS-IIT Roorkee**
- **Prof. (Dr.) Jugal Kishore, Former Head, Community Medicine Department, VMMCH**
- **Dr. Dharmesh Lal, Scientist E, ICMR**
- **Shri Kirtiman Awasthi, Senior Adviser and Project Head, GIZ**

Context Setting

Prof. Anil Kumar Gupta, Director, ICARS-IIT Roorkee contextualized RESSUMMIT 2026 as a unique science-policy-practice platform spanning 47 sessions, 250 speakers, and 450 delegates over three days. He described ICARS as India's youngest Centre of Excellence, established on the recommendation of the National Platform for Disaster Risk Reduction and mandated to integrate climate, disaster, and sustainability knowledge. He highlighted the launch of the Climate Knowledge Network of India on Day 1 and acknowledged over 45 partner organizations driving the summit. Emphasizing health as central to all development, he expressed hope that current challenges, heat, air pollution, water stress, and disasters, would be resolved for future generations by 2047.

"All science and research outcomes are not actually feeding effectively to policy and practice. This summit has been conceived to strengthen that interface, from concept to implementation."

Special Remarks

Dr. Jugal Kishor, Director Professor, Vardhman Mahavir Medical College, Safdarjung Hospital affirmed that health must remain central to all development frameworks, emphasizing that no meaningful progress, in infrastructure, engineering, or environment, is possible if human health is excluded. Drawing on decades of work in community medicine and disaster risk reduction, he underlined the summit's importance in creating space for AI technologists and health professionals to collaborate on diagnostics and prediction. He expressed particular concern about pandemic preparedness gaps exposed by COVID-19 and called for a national preparedness monitoring framework extending from primary health centres to sub-centres.

"Whether it is AI development or infrastructure, health has to be integral to it. If health is left out, there is no development. The youngsters should not face the same heat, air pollution, disaster, and water pollution that we are facing today."

Special Remarks

Dr. Anshu Sharma, Co-founder, SEEDS reflected on RESSUMMIT's most distinctive achievement, creating a space where scientists, practitioners, policymakers, data scientists, and AI experts communicated across disciplinary barriers in a common language. Recalling Einstein's principle that true understanding means explaining to a six-year-old, she observed that the summit had successfully bridged these communication divides by design. She emphasized that climate change is not a future threat, people are already struggling, and expressed genuine hope that the resolve demonstrated at the summit signals a meaningful shift toward translating scientific work into life-changing ground-level impact.

"The biggest highlight has been people from different backgrounds talking to each other in a language everyone understands. We are very rapidly moving towards a space where scientific and academic work can be translated into true life-changing experience for people on the front lines."

Special Remarks

Prof. André Lindner, Technical University of Dresden, Germany connected the summit's intergenerational spirit to his decades-long personal partnership with Indian colleagues, tracing it to a postgraduate program founded in Cold War East Germany, an example, he said, of science diplomacy surviving the most difficult geopolitical conditions. He praised the presence of young scholars at RESSUMMIT and emphasized that building their ambitions is essential for long-term resilience. Drawing on his biodiversity and restoration ecology teaching, he offered a stark evolutionary framework: when environments change, every living being has only three options, move, adapt, or die.

"The majority of species who ever lived on this earth are extinct. I hope our species will have a different fate, and this summit is a small but very important step in that direction."

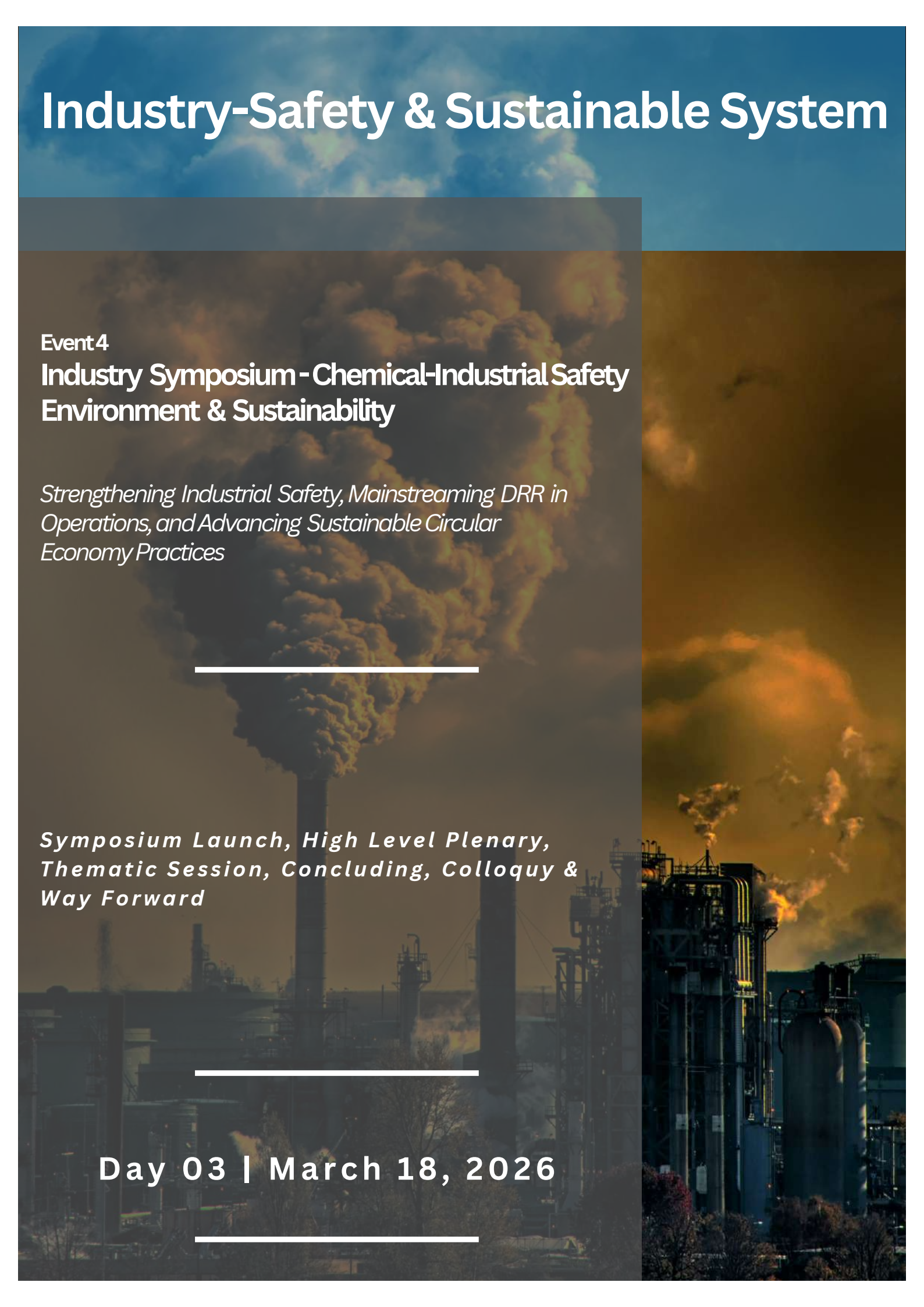
Special Remarks

Shri Afroz Ahmad, Hon'ble Member, National Green Tribunal delivered a wide-ranging address combining personal narrative, environmental jurisprudence, and urgent calls for ecological stewardship. He traced his journey in rigorous environmental management training, to establishing GB Pant Institute, overseeing Narmada rehabilitation, and finally to the National Green Tribunal, demonstrating how international knowledge exchange can serve national development. He cited alarming ground realities: 65% of wetlands lost in major cities, rivers reclassified as drains, groundwater in Punjab contaminated by chromium and pesticides, and 40% of India's solid waste still reaching water bodies. NGT's landmark orders, mandating District Environment Plans, wetland demarcation, and flood plain zoning for all major rivers, were presented as judicial tools for systemic environmental governance. He concluded with a call for a sustainable society built on ecology, equity, peace, and democracy.

"We are talking about resilience, but why has this word come into the picture? Because we have destroyed, modified, and replaced our natural resources. Environment and development can go together. I have proved it in Narmada. Unless we build a resilient India from panchayat to international level, with convergence of all departments and stakeholders, we cannot ensure sustainability."



Industry-Safety & Sustainable System



Event4

Industry Symposium - Chemical-Industrial Safety Environment & Sustainability

*Strengthening Industrial Safety, Mainstreaming DRR in
Operations, and Advancing Sustainable Circular
Economy Practices*

*Symposium Launch, High Level Plenary,
Thematic Session, Concluding, Colloquy &
Way Forward*

Day 03 | March 18, 2026

Industry-Safety & Sustainable System

Event 5

Resilience and Sustainability Policy Outlook Symposium

*High Level Synthesis of Policy Recommendations,
Governance Strategies and Future Outlook*

*Symposium Launch, High Level Plenary,
Thematic Session, Concluding, Colloquy &
Way Forward*

Day 03 | March 18, 2026

SESSION-WISE PROCEEDINGS

Introduction

Thematic Context

The third day of RESSUMMIT 2026 opened with a joint inaugural of two parallel symposium - Industry Symposium and Resilience and Sustainability Policy Outlook Symposium. Convened as part of a summit spanning 43 sessions and over 350 delegates across three days, the inaugural of day 3 set the tone for a day of deep, cross-sectoral dialogue on one of India's most pressing climate and disaster resilience challenges – Industrial Safety and Sustainability. The session brought together voices from industries, climate science and labour experts, collectively affirming that resilience, in India and globally, can no longer be built sector by sector.

1030 Symposium Launch - Inaugural Session | 9.15 - 10.45 | Main Hall

Session Partners: NDMA, NACWC, DGFASLI, UCOST & ICARS-IIT Roorkee

Speakers:

- **Prof. D.K. Aswal, Member, NDMA**
- **Shri V.C. Chaturvedi, DGFASLI, MoLE**
- **Smt. Roli Singh, Chairperson, National Authority for Chemical Weapons Convention**
- **Prof. Vimal Chandra Srivastava, IIT Roorkee**
- **Prof. Anil K. Gupta, ICARS-IIT Roorkee**
- **Prof. P.K. Joshi, SES-JNU**
- **Prof. Durgesh Pant, DG-UCOST**
- **Shri Prahlad Singh Adhikari, HAST**

Welcome Remarks

Prof. Anil K. Gupta (PI, ICARS-IIT Roorkee) opened the Industry Symposium by contextualizing Day 3 within the broader three-day structure of RESSUMMIT 2026. He described Day 1's focus on the Climate Knowledge Forum and launch of India's Climate Knowledge Network, Day 2's twin streams on regional vulnerabilities and health resilience, and Day 3's dedicated focus on industry, safety, and innovation. He emphasized the two-way nature of industry engagement, industries as both contributors to resilience solutions and as entities seeking business opportunities from safety services. He highlighted ICARS's unique positioning as a government-established centre on an IIT campus, enabling direct linkages with ministries while maintaining academic rigour. He noted that NITI Aayog and NDMA had requested

finalized recommendations within one to two months, and specifically sought guidance on chemical and industrial safety. He also announced the release of proceedings from the World Summit on Disaster Management 2025, Dehradun.

"Industries are looking at business opportunities as well, it is a two-way thing. They are contributors and profit makers both, because these services are very much required. The good lessons coming from industries and their challenges can help the research community provide solutions."



Inaugural Remarks

Dr. DK Aswal, Member, NDMA delivered a data-driven and candid assessment of India's industrial and chemical risk landscape. He revealed that India has recorded over 130 major chemical accidents in recent decades, causing hundreds of deaths and thousands of injuries, with incidents increasing by 15-20% annually. India's 1,800-plus Major Accident Hazard units spread across 300 districts handle hazardous chemicals with inadequate oversight, particularly in the informal sector. He identified systemic gaps: early warning systems exist but are not acted upon; regulations exist but enforcement is uneven; and communities, especially those outside plant perimeters, remain unaware and unprepared. He called for integration of chemical industries into District Disaster Management Plans, real-time monitoring dashboards accessible to district authorities, third-party environmental audits, and a shift from inspection-based compliance to risk-intelligent systems. He referenced the Bhopal and Visakhapatnam tragedies as evidence that safety continues to be treated as an afterthought.

"Industrial accidents are not just accidents, they are indicators. They reveal the gap between what we know and what we practice. Growth without safety is incomplete. Systems without sensitivity are fragile. Knowledge without application is insufficient."

Special Address

Ms. Roli Singh, Chairperson, National Authority for Chemical Weapons Convention addressed the strategic intersection of chemical industry safety, sustainability, and India's obligations under the Chemical Weapons Convention, a treaty India has signed as one of the world's six largest chemical producers, contributing 3% of global chemical sales. She outlined India's strong legislative framework, including the CWC Act 2000, WMD Act 2005, and the SCOMET national control list, while acknowledging that implementation gaps remain significant. She emphasized that CWC compliance should be viewed not as a statutory burden but as a strategic competitive advantage, signalling trustworthiness to international partners and markets. She highlighted the Indian Chemical Council's Responsible Care and NISO Globe initiatives, recently recognized with an OPCW award, the first for an Indian body, as models of shared public-private responsibility. She called for embedding chemical safety protocols into university education so that the workforce enters industry already informed, and stressed the need for real-time coordination between the National Authority, DGFT, customs, and district authorities for chemical movement tracking.

"A chemical industry that is environmentally efficient but unsafe or insecure cannot be considered sustainable. Safety and security by design is fundamental, it must be integrated into plant design, process engineering and operational management from selection of raw materials to waste disposal."

Remarks

Shri V.C. Chaturvedi, Director General, Factory Advice Service and Labour Institute (DG FASLI) Speaking as the apex technical body on occupational safety and health in India, DG FASLI's representative situated industrial safety squarely within Vision 2047's development agenda. He emphasized that India's rapid industrial expansion across chemicals, petrochemicals, pharmaceuticals, energy, and logistics introduces complex, evolving risks to both infrastructure and the workforce, making occupational safety a core development planning imperative, not a regulatory afterthought. He outlined the Occupational Safety, Health and Working Conditions Code 2020 as a unified, risk-based framework emphasizing compliance, accountability, and continuous improvement. Critically, he argued that beyond technical systems, the most decisive factor in industrial safety is human intellect and risk perception, noting that many incidents arise not from technical failures but from gaps in training, supervision, and safety culture. He called for process safety management, hazard operability studies, quantitative risk assessment, and behavioral safety interventions to be systematically integrated with real-time IoT monitoring and digital compliance platforms.

"Many industrial incidents occur not just due to technical failures but due to gaps in understanding, training, supervision and safety culture. Technology alone is not sufficient, its effectiveness depends on trained manpower, proper interpretation of data and the ability to take timely and informed decisions."

Remarks

Prof. Durgesh Pant, DG-UCOST reflected on the significance of multi-stakeholder summits in building disaster resilience, emphasizing that science, technology, and innovation are central

to mitigation and preparedness. Drawing from experiences across villages, states, and nations, the session highlighted that resilience emerges when communities, industries, and institutions act together through actionable plans not mere discussions.

"Disasters will be there whether natural or man-made but we have to be resilient; that is why all these summits are very important."

Remarks

Prof. P.K. Joshi, JNU opened by acknowledging industries as foundational engines of national progress, contributing significantly to GDP and employment since independence. At the current global juncture, industries hold a dual responsibility ensuring occupational safety and building disaster risk resilience making them central to climate change mitigation and sustainable infrastructure development.

The speaker stressed that effective policies and practices must be rooted in ground evidence, urging stronger linkages between academic institutions, research bodies, and industry. Acknowledging a personal responsibility as an academician, the speaker candidly noted that this connect remains weak and must be urgently addressed.

A call was also made to integrate modern technologies — data science, artificial intelligence, and decision-support tools — into conventional industries to enable smarter, more resilient operations.

"The knowledge being generated in classrooms and research institutions must find its connect with the ground only then can resilience sustain for a longer period."

Remarks

Prof. V. C. Srivastava, IIT Roorkee gave an academic and institutional perspective on disaster preparedness, drawing on IIT Roorkee's extensive research infrastructure, including its globally rare Department of Earthquake Engineering and Centre for Disaster Risk. He framed any disaster across three essential dimensions: prevention through safety-by-design before events occur; preparedness and life-saving response during disasters; and recovery and build-back-better after events. He noted that while design-based safety works well for industrial hazards, natural calamities require vulnerability studies and policy-oriented research. He advocated strongly for AI and machine learning as tools to generate predictive science where established models are absent, enabling back-propagation from data to knowledge. He also emphasized life cycle assessment and social impact assessment as essential sustainability tools for industrial projects, and offered IIT Roorkee's Continuing Education Centre for industrial and government training programmes

"AI and ML can actually help a lot in aspects where there is no clear-cut science established. If you don't have science well established, from data we can actually predict many things and AI can give the science back through propagation. These are the things which are possible."

Remarks

Shri Prahlad Adhikari, Secretary, HAST spoke as secretary of the World Summit on Disaster Management 2025, Dehradun, whose proceedings were formally released during this session.

He positioned the summit as part of a continuing journey to place the Himalayas at the centre of global discourse on climate, sustainability, and disaster management. Drawing on the Silkyara tunnel rescue of 2023, where 41 workers survived 17 days underground, as a defining proof of concept, he elaborated a five-E framework: Engaging communities, Educating them on risks and responses, Enabling them with knowledge and tools, Empowering them with resources and technology, and achieving Excellence in disaster management. He emphasized that UCOST's work is grounded in concrete, community-level implementation, at village, block, women's group, and student level, rather than theoretical frameworks. He called for science, technology, and innovation to remain central to all resilience efforts.

"Disasters will be there, anthropogenic, natural, all kinds. We got to be resilient. Science and technology and innovation is the core through which we can mitigate and we can address and look forward to a better understanding. When communities are involved, when self-help groups are involved, when volunteers are involved, that builds an ecosystem that takes the resilience formula forward."



P031

High Level Plenary : Industrial Chemical Accidents: Techno-legal Regime, Codes & Standards | 11.15 - 12.15 | Main Hall

Session Partners: DGFASLI & ICARS-IIT Roorkee

Guests:

- **Dr. Kunal Sharma, Assistant Director (S), RLI, Faridabad, DGFASLI**
- **Shri Himanshu Shekhar, Senior Editor, NDTV**
- **Shri Mukesh Mohan ED HSE IOCL**
- **Prof. Anil K. Gupta, ICARS-IIT Roorkee**
- **Shri Arun Mittal, Former ED-Oil Industry Safety Directorate (OISD)**
- **Prof. Vimal Chandra Srivastava, Head, Centre for Sustainable Energy & G B Pant Institute Chair, Professor at IIT, Roorkee**

Background: With the rapid growth of chemical and process industries, concerns around industrial safety have become increasingly important. Industrial chemical accidents can have serious consequences, affecting workers, nearby communities, and the environment. Many such incidents occur due to gaps in safety practices, weak enforcement of regulations, or inadequate implementation of codes and standards. Strengthening the techno-legal framework and ensuring better compliance with established safety standards is therefore essential. This session will focus on understanding current challenges in chemical-industrial safety and the role of regulations, codes, and institutional mechanisms in preventing accidents. It aims to encourage discussion on improving safety governance and promoting more responsible and resilient industrial operations.

Key Discussion Points

- Strengthening industrial safety requires strong enforcement of existing regulations, continuous capacity building, and proactive risk assessment across all facility types, not just post-incident response. DGFASLI's role in occupational safety must be supported by stronger regulatory compliance and inter-agency coordination.
- Media plays a critical accountability role in bridging policymakers, industries, and the public, transparent, responsible journalism that raises awareness of safety lapses and best practices can directly influence policy reforms and encourage adoption of safer industrial operations.
- Safety culture must be embedded at every organisational level, from leadership to field workers. Leadership commitment, employee engagement, technology-enabled monitoring, and strict standards compliance are all non-negotiable in high-risk sectors like oil, gas, and chemical industries.

- Environmental regulations governing chemical industries have persistent implementation gaps. Stronger enforcement mechanisms, regular regulatory updates aligned with emerging risks, and mandatory environmental impact integration into industrial planning are essential for sustainable and safe industrial operations.
- Predictive analytics, digital modelling, and data-driven decision-making must shift industrial safety management from reactive incident response to proactive hazard prevention, with advanced technologies adopted broadly across the sector, supported by international research collaboration.

Innovations and Good Practices

- AI-driven predictive safety analytics and early warning systems enabling real-time industrial hazard monitoring, shifting management from post-incident reactive response to proactive prevention and continuous operational risk tracking across complex industrial facilities.
- Conversion of industrial and agricultural waste into biofuels, simultaneously supporting sustainable energy generation, reducing industrial waste disposal risks, and strengthening rural livelihood resilience through circular economy approaches to industrial byproduct management.
- Geospatial technologies and climate risk mapping integrated into industrial infrastructure planning and disaster management, enabling evidence-based facility siting decisions and operational risk assessments that account for climate-induced hazard scenarios.

Policy Insights

- Integrate climate change projections and industrial risk assessments as mandatory components in national and local development planning frameworks, required for all industrial facility approvals, operating licenses, and periodic risk recertification processes.
- Develop dedicated policies promoting AI-based disaster management tools, sustainable process technologies, and renewable energy adoption within industrial operations, backed by regulatory incentives and clear implementation timelines.
- Strengthen community-based industrial safety governance and improve structured inter-agency data sharing among DGFASLI, CPCB, NDMA, and state authorities for more strong, transparent industrial risk governance at district and state levels.



Way Forward

- Establish mandatory, periodically updated industrial risk assessments integrating climate change projections into all major hazardous facility operating licenses and emergency response plans across India.
- Strengthen real-time environmental and safety monitoring with enhanced CPCB data analytics capabilities for continuous regulatory compliance tracking and early identification of emerging industrial hazard conditions.
- Develop structured industry-media-government dialogue platforms to improve transparency, public accountability, and timely early warning communication around industrial chemical hazards and environmental risks.
- Build indigenous technical capacity in chemical process safety through sustained academia-industry collaboration, reducing dependence on imported expertise and creating an Indian cadre of industrial safety specialists.

P032

High Level Plenary : Integration of Industry with Holistic Resilience and DRR

12.15 - 13.15 | Main Hall

Session Partners: DGFASLI & ICARS-IIT Roorkee

Guests:

- *Dr. Mary Ana McGlasson, Deakin University*
- *Dr. Vishal Gandhi, Scientist, CPCB*
- *Dr. Lakshmi Raghupathy,*
- *Prof. N. V. C. Menon, Founder Member, National Disaster Management Authority (NDMA), Government of India.*
- *Prof. Dilanthi Amaratunga, Professor of Disaster Risks and Climate Resilience, Loughborough University.*
- *Prof. Thomas Hofmann, President of the Technical University of Munich (TUM)*
- *Dr. Sreeja S Nair, Deputy Team Leader and DRR Specialist, Tarutium Global Consulting*
- *Shri Nadeem G. Siddiqui, Jt. Secretary, DMD, Bihar*

Background: Industries are vital for economic growth, employment, and national development, but they are increasingly exposed to risks from natural hazards, technological failures, climate change, and supply chain disruptions. However, many industrial systems are still not fully integrated into broader disaster risk reduction (DRR) and resilience planning. Strengthening this integration is essential to ensure business continuity, protect workers and communities, and reduce the impacts of disasters on industrial operations. This session will explore how industries can be better aligned with holistic resilience approaches, including risk assessment, preparedness, and coordinated response mechanisms. The discussion aims to highlight practical pathways for making industrial development safer, more adaptive, and more resilient.

Key Discussion Points

- Industries must formally develop, share, and integrate on-site and off-site emergency plans into district and state disaster management frameworks, this remains a critical governance gap despite existing legal requirements under EPA and MSIHC rules.
- Historical industrial disasters, Bhopal, Kobe, Mayapuri, demonstrate that long-term environmental and health consequences are irreversible and massively exceed initial response costs. Prevention and mitigation must therefore be treated as non-negotiable core business obligations, not optional safety investments.

- Supply-chain resilience through diversification, redundancy, and "just-in-case" multi-sourcing strategies significantly reduces systemic vulnerability from single-point failures, shifting from lean, efficiency-optimised supply chains to resilience-optimised systems better able to absorb and recover from shocks.
- Natech risks, natural hazard-triggered technological disasters, are critically under-addressed in most district disaster management plans. Dedicated natech planning, regulation, and community engagement are urgently needed, particularly in industrially dense zones vulnerable to flooding, earthquakes, and cyclones.
- Monitoring, enforcement, and institutional coordination among pollution control boards, disaster management authorities, and industrial regulators remain chronically weak, overlapping jurisdictions, unclear accountability structures, and inadequate compliance auditing collectively amplify industrial disaster risk across India.

Innovations and Good Practices

- AI/ML analytics combined with real-time emissions and safety monitoring data for proactive industrial risk management, shifting from static compliance documentation to predictive safety intelligence that anticipates hazardous conditions before incidents occur.

- Digital twins and multi-hazard scenario simulation tools for comprehensive supply-chain and industrial risk assessment, enabling companies and regulators to model cascading failure pathways and test resilience interventions before real-world implementation.



- Public-private partnerships formally investing in local community infrastructure, social services, and workforce resilience as integrated components of corporate industrial DRR strategies,

recognising that community resilience is inseparable from business continuity.

Policy Insights

- Mandate formal integration of industry off-site emergency plans into all district and state disaster management frameworks, with defined monitoring roles, compliance timelines, and enforcement mechanisms linking industrial facilities to local DRR governance structures.
- Strengthen inter-agency coordination by clarifying overlapping responsibilities among pollution control boards, disaster management authorities, and industrial regulators, establishing unified accountability frameworks that prevent dangerous governance gaps between jurisdictions.

- Require transport emergency cards, mandatory hazard communication disclosures, and tighter regulatory oversight of small-scale chemical handlers, whose collectively high cumulative risk profile currently receives disproportionately little regulatory attention compared to large industrial facilities.

Way Forward

- Develop a comprehensive national NaTech risk framework integrating industrial hazard planning into district disaster management plans, prioritising flood-prone and seismically active industrial corridors where natural-technological risk convergence is highest.
- Shift the industrial resilience approach from reactive recovery to proactive evolutionary endurance, through structural hardening, supply-chain decoupling, socio-economic community investment, and continuous adaptive learning from each disaster and near-miss event.
- Establish standardized joint emergency exercises among military, police, state agencies, and industry using common interoperable procedures and simple shared communication tools, reducing coordination failures in complex hazmat and industrial accident scenarios.
- Extend AI/ML safety analytics capabilities to SMEs through incentive-based adoption programmes and regulatory support, ensuring small and medium industrial enterprises receive equivalent risk management tools to large industrial facilities.

T033

Thematic : Beyond Forecasting: Building People-Centred & Low-Cost EWS for a Changing Climate
14.15 - 15.30 | Sankalp

Session Partners: LOADSTAR: IIT G, IISc, IIT-T, CSTEP, ICARS-IITR, DST-GO

Panellists:

- **Dr. Indu K. Murthy – Sector Head, Climate, Environment & Sustainability, CSTEP**
- **Dr. Rajarshi Bhowmik – Associate Professor, IISc Bengaluru**
- **Dr. Chandra Sekhar Bahinipati – Associate Professor, IIT Tirupati**
- **Dr. Debanga Raj Neog – Indian Institute of Technology Guwahati**
- **Prof. Anil K. Gupta – ICARS-IIT Roorkee**
- **Prof. Anamika Barua – Professor, Indian Institute of Technology Guwahati**

Background: Early Warning Systems (EWS) are increasingly sophisticated, yet many remain technocratic and top down, creating a gap between hazard forecasts and community decision-making. This session addresses the need for participatory, impact-based, and low-cost multi-hazard early warning systems that integrate modelling, AI-ML tools, and citizen-generated data. Aligned with Vision 2047 and national resilience priorities, the session advances anticipatory governance, localization of disaster risk reduction, and digital innovation for climate adaptation. It contributes to building inclusive, technology-enabled, and community-driven resilience systems.

Key Discussion Points

- Designing sophisticated EWS tools without first understanding who the users are and what systems already exist produces technically advanced but practically unusable systems. Community co-creation through interdisciplinary approaches, natural and social sciences combined, is foundational, not supplementary, to effective EWS design.
- The LODESTAR living lab approach in Guwahati and Bengaluru systematically identifies gaps between existing warning systems and actual community needs, then feeds these insights back into low-cost EWS dashboard design, ensuring flood risk communication is simple, granular, location-specific, and genuinely action-oriented.
- The central challenge is not model quality but turning scientific flood predictions into trusted, concrete, location-specific decisions that communities, schools, and local

administrators can actually understand and respond to, the gap between forecast generation and community action remains the critical bottleneck.

- A three-phase low-cost AI pipeline integrating diverse inputs, sensors, smartphones, third-party APIs, dash cams, provides real-time city-scale flood intelligence affordably and scalably, with future plans to compress models for on-device smartphone operation during connectivity-disrupted flood events.
- Repeated forecast failures create trust deficits as critical as technical model limitations. Any technical EWS solution must therefore be co-designed iteratively with users and decision-makers, not developed by researchers in isolation and delivered to communities as finished products.

Innovations and Good Practices

- LODESTAR low-cost multi-hazard EWS combining technical sensor and satellite data with citizen-generated crowdsourced imagery, anchored in living lab co-creation platforms connecting scientists, policymakers, communities, schools, and administrators across three geographically and climatically distinct Indian study sites.
- Multi-modal early warning communication translating complex hydromet and flood prediction data into color codes, sounds, and simple maps, making warnings accessible to technologically challenged, linguistically diverse, and otherwise vulnerable populations who cannot interpret technical scientific outputs.
- Living labs integrating indigenous farmer and community knowledge with scientific drought and climate models in Anantapur, producing more context-specific, trusted, and practically concrete drought management advisories than purely model-driven outputs could deliver alone.

Policy Insights

- Incentivize community-centered, low-cost, multi-hazard EWS over purely high-tech single-hazard solutions, current policies favour sophisticated systems that are financially unsustainable for municipalities and fail at last-mile connectivity and community engagement where disasters actually unfold.
- Prioritise last-mile usability alongside technical quality in all EWS policy frameworks, warnings in simple formats through trusted channels delivered at the right time are more valuable than technically sophisticated forecasts that communities cannot understand or act upon.
- Formalize privacy-by-design principles for citizen-generated flood imagery and data, including removal of identifiable markers, secure storage, and transparent data governance, as mandatory procurement and operational standards for all publicly funded EWS programmes.

Way Forward

- Rethink drought declaration and warning frameworks to explicitly recognize regional rainfall baseline variability, integrating local agroecological knowledge into official drought advisories alongside meteorological thresholds that currently miss local agricultural realities.
- Establish formal city-scale flood monitoring networks with trusted, official communication channels from scientists to local decision-makers and communities, replacing fragile, ad-hoc WhatsApp-based informal systems currently carrying critical life-safety warning information.
- Accelerate on-device AI model development enabling flood intelligence processing directly on smartphones, improving EWS resilience during actual floods when cellular network congestion and connectivity disruption are most likely to compromise server-dependent warning delivery.
- Develop national guidelines formalizing living lab co-creation methodologies as replicable, scalable models for district and city-level EWS design, establishing community data co-creation as a standard requirement in all government-funded early warning system procurement and development programmes.

T034	Thematic : Changing Risk Perspectives: Experiences Across India 14.15 - 15.15 Sanrakshan
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Session Partners: UNDP, FCDO, NITI Aayog

Panellists:

- Dr. Joy Elamon, Member, Kerala State Disaster Management Authority (KSDMA)
- Mr. Vidiyala Ravi, PI Foundation, Gujarat
- Dr Mona Anand, ADPC
- Ms. Nivedita Mani; Communication Head, GEAG
- Ms. Somya Bhatt; Project Specialist, UNDP India
- Ms. Sushmita Behera, OSDMA

Background: As disaster and climate risks become increasingly systemic, public institutions must transition from reactive response to anticipatory, risk-informed governance. This session will bring together national and state disaster management authorities to examine evolving risk patterns and institutional pathways for strengthening resilience across governance levels. The discussion will highlight lessons on strengthening subnational leadership, engaging the private sector in industrial risk management, advancing regional cooperation for flood preparedness in the Bay of Bengal, and leveraging digital and data systems for disaster governance. The session contributes policy insights for advancing resilience under Vision 2047.

Key Discussion Points

- Shifting from reactive disaster response to anticipatory, risk-informed governance is the most critical institutional transition required, managing compounding climate risks demands proactive planning, forward-looking investment, and governance systems designed to prevent disasters rather than merely respond to them.
- Strengthening subnational disaster management institutions, SDMAs, district authorities, and empowering local governance with adequate resources, technical capacity, and decision-making authority is essential for translating national DRR frameworks into locally relevant, accountable, and effective resilience measures.
- Private sector engagement in industrial risk management and supply-chain resilience is increasingly critical, climate risks are cascading across economic systems in ways

that traditional government-centric DRR frameworks cannot adequately address without formal business sector participation and accountability.

- Regional cooperation in the Bay of Bengal is vital for effective transboundary flood preparedness, shared early warning systems, coordinated response protocols, and multi-country climate adaptation planning are essential given the deeply transboundary nature of South Asian hydrological and atmospheric hazards.
- Digital technologies, integrated open data systems, and interoperable early warning mechanisms are key enablers of efficient, transparent, evidence-based disaster governance, yet data sharing barriers, proprietary systems, and inconsistent standards continue to undermine their full potential across India.

Innovations and Good Practices

- Digital platforms and real-time data-driven systems enabling multi-hazard disaster monitoring, risk tracking, and transparent governance, connecting state disaster management authorities, district administrators, and community responders through integrated information flows across governance levels.



- Community-based communication strategies using grassroots networks, participatory media approaches, and local language messaging to improve disaster risk awareness among the most vulnerable and often least-reached populations in India's diverse geographic and linguistic landscape.

- Regional Bay of Bengal coordination mechanisms for transboundary flood forecasting, multi-country early warning sharing, and coordinated disaster preparedness and response, demonstrating that regional cooperation can significantly enhance individual national DRR effectiveness.

Policy Insights

- Institutionalize risk-informed governance by making disaster risk assessment a mandatory, structured input into all development planning, infrastructure approvals, and investment decisions at national, state, and district governance levels across all sectors.
- Establish formal multi-stakeholder DRR collaboration frameworks that integrate private sector participation, with clear roles, accountability mechanisms, and incentive structures for corporate engagement in supply-chain resilience and industrial risk management.
- Invest strategically in open digital infrastructure, interoperable data-sharing platforms, and standardized early warning systems, removing proprietary barriers

that currently fragment disaster data and undermine coordinated, evidence-based governance responses.

Way Forward

- Develop state-level anticipatory governance frameworks embedding climate risk projections into annual development planning, infrastructure approval, and fiscal budgeting processes, making forward-looking risk assessment a routine governance function rather than a crisis-triggered response.
- Establish formal private-sector DRR partnership frameworks with legally defined roles, performance incentives, and public accountability mechanisms for supply-chain resilience and industrial hazard risk management across key economic sectors.
- Expand regional South Asian cooperation mechanisms beyond the Bay of Bengal to include shared climate modelling resources, joint early warning infrastructure investment, and coordinated transboundary adaptation planning for shared river basins and climate systems.
- Build structured subnational DRR capacity through dedicated training programmes, peer-learning exchanges between SDMAs, and technical resource centres supporting district authorities with data, tools, and expertise for risk-informed local governance.

T035

**Thematic: Methods and Indicators for Climate Adaptation
Prioritisation in the Agriculture Sector
14.15 - 16.15 | Srijan**

Session Partners: GIZ, CoEDM-IIT Roorkee

Panellists:

- **Prof. P. K. Joshi, Jawaharlal Nehru University (TBC) Moderator: (TBC)**
- **Dr. Roopam Shukla, IIT Roorkee**
- **Dr. Subash N. Pillai, Head, Division of Agricultural Physics, ICAR-Indian Agricultural Research Institute, Pusa Campus, others (TBC)**
- **Ms. Nivedita Mani, GEAG**

Background: The CRITICAL initiative, under Indo-German cooperation (CAFRI II–GIZ India) in collaboration with IIT Roorkee, focuses on building climate resilience in smallholder systems of the Shiwalik region, Uttarakhand. It integrates gender-responsive and risk-informed adaptation aligned with national frameworks such as NAPCC, SAPCCs, and the IPCC AR6 risk framework. The project emphasizes inclusive, locally contextualized adaptation pathways. However, climate adaptation prioritisation in India often remains fragmented due to varied institutional interpretations, limited use of risk evidence, and competing development priorities. The workshop aims to discuss methods and indicators for prioritizing adaptation in agriculture, improving conceptual clarity, and enabling transparent, equitable, and risk-informed decision-making aligned with Vision 2047.

Key Discussion Points

- Agricultural climate risk assessments must integrate high-resolution downscaled data and agrometeorological indicators beyond mean climate variables, capturing local yield impacts on specific crops like rice and wheat, and basin-level interlinkages between water availability and agricultural productivity.
- Vulnerability to climate change is fundamentally socially differentiated, differences in landholding, resource access, gender, and socioeconomic capacity mean similar climatic exposure produces highly unequal adaptive outcomes, requiring explicit intersectional analysis in all adaptation planning frameworks.
- Incremental adaptation strategies, short-term, often project-bound adjustments, are insufficient for the scale of structural change needed. Fundamental adaptation involving long-term systemic change is necessary to address root vulnerabilities and enable communities to independently sustain resilience without external support.

- Bridging scientific knowledge with local realities and indigenous knowledge systems is critical, ground-truthing models through community knowledge integration ensures adaptation strategies are contextually appropriate, practically implementable, and trusted by the farming communities they are designed to serve.
- Sectoral fragmentation across agriculture, water, and rural development departments remains the dominant institutional barrier, weak convergence and poor inter-departmental coordination continue to constrain effective implementation of integrated climate adaptation strategies at scale across Indian states.

Innovations and Good Practices

- Use of 5 km × 5 km downscaled climate models combined with crop simulation tools for localised agricultural risk assessment, enabling yield impact projections for specific crops at district and sub-district scales rather than relying on state or national averages.
- Integration of basin-level water availability modelling with agricultural productivity assessment, capturing critical interlinkages between hydrological stress and crop yield outcomes that purely agronomic models fail to account for under changing precipitation and temperature regimes.
- Systematic combination of scientific climate data with local indigenous knowledge for ground-truthing, ensuring adaptation recommendations reflect on-the-ground agricultural realities, community capacities, and farmer-held knowledge that formal models often miss or misrepresent.



Policy Insights

- Develop multi-criteria adaptation prioritisation frameworks explicitly incorporating equity, gender, landholding size, and social differentiation, ensuring agricultural climate policy addresses structural vulnerability rather than assuming uniform adaptive capacity across farming populations.
- Strengthen decentralised, context-specific adaptation planning processes that empower local agricultural institutions, district-level agriculture offices, farmer producer organisations, and panchayats, to design and implement area-appropriate climate responses.

- Mandate enhanced inter-departmental convergence across agriculture, water, and rural development, establishing formal coordination mechanisms that eliminate sectoral silos preventing integrated, landscape-scale climate adaptation strategy implementation.

Way Forward

- Invest in high-resolution climate modelling infrastructure and agrometeorological monitoring networks at sub-district scales, enabling precision adaptation planning accessible to local agricultural administrators and farming communities across India.
- Develop national guidelines requiring intersectional vulnerability assessment in all state agricultural adaptation plans, making gender, landholding, and socioeconomic indicators mandatory analytical inputs rather than optional additions.
- Build institutional platforms for structured, sustained science-policy-practice dialogue ensuring fundamental adaptation research findings are routinely translated into national and state-level agricultural policy, budget allocations, and programme design.
- Strengthen technology transfer and capacity-building programmes enabling smallholder farmers to access and apply climate-smart agricultural tools and information without requiring high capital investment or advanced technical literacy as preconditions for adoption.

T036

Thematic: Climate and Water Resilient Industries: Pathways for Collective Action
14.15 - 15.15 | Santulan

Session Partners: WWF

Panellists:

- *Dr. Suresh Babu, WWF*
- *Shri Anil K Choudhary, EESL*
- *Dr. Anshuman, TERI*
- *Dr. Victor R. Shinde, NIUA*
- *Shri Suresh Manoharan, Best Colour Solutions*
- *Shri Azhaiya M Rahman, VRNC*
- *Shri Shivasubramaniam, Prime Tech Knit Prints*
- *Shri Hemant Juneja, Oliver McInroy*
- *Prof. Vinod Tare, Head, C-Ganga, IIT Kanpur*
- *Shri Suresh Kumar, IAS (Retd.), Sr. Strategic Manager, WWF India*
- *Shri . S. Raghvan, Govt. of Tamil Nadu*
- *Dr. P. Thanikaivelan, CSIR-CLRI*
- *Dr. V. Mehandia, IIT Ropar*
- *Dr. P. Saravanan, CSIR-CLIR*

Background: The session aims to convene industry leaders, policymakers, and sustainability practitioners to exchange insights on approaches, tools, and frameworks for addressing the growing risks associated with climate change and water security. It seeks to facilitate the sharing of industry-level and basin-scale best practices for mitigating climate- and water-related risks through science-based approaches, including the demonstration of innovative cleaner technologies and collaborative initiatives. The platform will further enable stakeholders to deliberate on key technological, practical, and policy recommendations, identify shared challenges at the basin scale, and explore pathways for collective action towards sustainable and resilient water governance.

Key Discussion Points

- Individual industry water efficiency has improved significantly across sectors, but basin-level water health continues to decline, the fundamental gap between unit-level

operational performance and system-level basin outcomes is the defining challenge that current industrial water governance fails to address.

- Water, energy, and carbon footprint must be managed as an integrated system rather than in isolation. Shifting industry perception from sustainability-as-compliance-cost to sustainability-as-productivity-enhancement is the critical cultural and economic change needed to drive genuine industrial water resilience.
- High capital costs and compliance burdens, especially prohibitive for MSMEs, significantly limit technology adoption. Making the business case for efficiency investment through productivity framing, financial incentives, and accessible implementation programmes is essential to accelerate sector-wide change.
- Governance failures, transparency deficits, and excessive inspector-based regulatory intervention actively discourage voluntary industry participation in water efficiency and sustainability programmes, creating adversarial rather than collaborative relationships between industry and regulatory authorities.
- India faces a water management problem, not absolute water scarcity, policies must focus on closing water loops at appropriate basin scales and formally integrating industries as active participants in water resource development and management systems, not just regulated water users.



Innovations and Good Practices

- Zero Liquid Discharge (ZLD) technologies achieving high water recovery rates in textile industry clusters, demonstrating technical and operational feasibility of near-complete wastewater recycling at industrial scale when consistently implemented and enforced across entire clusters.
- Rainwater harvesting and reuse systems reducing freshwater dependency across water-stressed industrial operations, providing cost-effective, decentralised water security solutions particularly suited to industries in seasonally water-scarce regions of India.
- Real-time data, sensor-based monitoring, and integrated management systems enabling efficient industrial water management, continuous compliance tracking, and resource optimization, creating data-driven operational intelligence for sustainable industrial water use.

Policy Insights

- Shift industrial water governance from adversarial, compliance-driven frameworks to collaborative, outcome-oriented systems, reducing inspector-based regulatory control, increasing transparency, and building industry confidence that sustainability investment will be rewarded rather than penalised.
- Establish formal basin-level governance structures with legally mandated industry participation alongside government and civil society, enabling collective water resource management that addresses basin health rather than only individual facility compliance.
- Develop targeted support frameworks for MSMEs, including affordable technology pathways, simplified regulatory processes, and financial incentives, to ensure water efficiency change is not limited to large industries capable of absorbing high compliance and capital burdens.

Way Forward

- Mandate basin-level water stewardship plans for all industrial clusters, linking unit-level efficiency metrics to collective basin health monitoring, reporting, and adaptive management requirements under national water resource governance frameworks.
- Create structured incentive frameworks, financial, regulatory, and reputational, to accelerate industry-wide adoption of ZLD and circular water technologies, making sustainable water use economically attractive across all industrial sectors and company sizes.
- Establish multi-stakeholder basin governance bodies with formal, legally recognised industry representation, enabling coordinated collective action on shared water risks, sustainable resource management, and long-term basin health restoration.
- Align industrial water standards and practices with India's national climate commitments, integrating mandatory water risk disclosure into corporate sustainability, ESG reporting, and national climate policy monitoring frameworks under Vision 2047.

T037	Thematic: Sustainability and Resilience: Mapping Co-benefits and Integration 15.40 - 16.40 Sanrakshan
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Session Partners: ICARS-IIT Roorkee

Panellists:

- *Prof. Kalachand Sain, CSIR-NGRI*
- *Shri Manoj Dabas, Country Director - India CIFOR-ICRAF (Center for International Forestry Research & World Agroforestry)*
- *Prof. S. Sreekesh, JNU*
- *Shri Gaurav Bansal, Advocate, Supreme Court of India*
- *Prof. Bhawna Pathak, CUG*
- *Shri Dheeraj Tewari, Expert Industrial Cybersecurity.*
- *Shri Shashikant Chopde, Taru Leading Edge*

Background: Sustainability and resilience are often addressed separately in policy and practice, yet both are essential for long-term development and risk reduction. As societies face increasing pressures from climate change, environmental degradation, and disasters, there is a growing need to integrate sustainability goals with resilience strategies. Mapping co-benefits can help identify actions that simultaneously strengthen environmental protection, economic stability, and disaster preparedness. This session will explore how sustainability initiatives and resilience planning can be better aligned across sectors. It aims to highlight practical approaches, policy linkages, and collaborative efforts that enable integrated planning, ensuring that development pathways are both sustainable and resilient.

Key Discussion Points

- Translating existing climate and resilience knowledge into concrete implementation strategies, rather than generating additional research, is now the most urgent national priority for building genuine, measurable resilience outcomes aligned with Vision 2047.
- Integrating sustainability and resilience into university curricula and campus operations as living laboratories is essential for equipping future leaders with the practical interdisciplinary problem-solving capacities, ethical grounding, and systems-thinking skills that complex climate challenges require.
- Cybersecurity must be embedded as a foundational design principle in all modern technological systems, sensors, drones, and industrial networks. Traditional air-gap

isolation approaches are no longer adequate in connected Industry 4.0 environments facing increasingly sophisticated cyber threats.

- Sustainability and resilience are not always naturally aligned, practices like stubble burning may provide short-term agricultural resilience while remaining environmentally unsustainable. Clear, measurable, comparable benchmarks for evaluating practices across both dimensions are urgently needed.
- Disaster-resilient infrastructure, scientific hazard mapping, and strong early warning systems remain the most critical practical co-benefits linking sustainability and resilience at the national scale, requiring coordinated investment across energy, water, health, agriculture, and built environment sectors.

Innovations and Good Practices

- Universities functioning as "living laboratories" for sustainability and resilience, engaging students in hands-on research, community partnerships, and real-world problem-solving aligned with SDGs, generating practical knowledge while simultaneously developing next-generation climate-capable leaders.
- Deployment of sensors, drones, and AI-based early warning and monitoring systems for hazard detection, disaster risk reduction, and performance tracking of climate-resilient infrastructure, providing continuous real-time intelligence for adaptive management decisions.
- Industry-academia collaboration using real-time industrial cybersecurity case studies, enabling research curricula to remain directly relevant to actual operational challenges, accelerating knowledge transfer between academic institutions and industrial practitioners.



Policy Insights

- Mandate sustainability and resilience as core, practically applied competencies in all higher education curricula at undergraduate and postgraduate levels, moving beyond theoretical coverage to hands-on application through campus living laboratories and community-engaged learning.

- Strengthen national cybersecurity policies and enforceable technical standards for industrial and critical infrastructure systems, establishing mandatory implementation timelines, regular compliance auditing, and clear liability frameworks for cyber-resilience failures.
- Develop integrated policy frameworks explicitly linking sustainability targets, resilience goals, and sectoral planning across energy, water, health, agriculture, and infrastructure, eliminating siloed departmental approaches that prevent realisation of cross-sectoral co-benefits.

Way Forward

- Urgently develop measurable, comparable, and standardised benchmarks for evaluating practices across both sustainability and resilience dimensions simultaneously, addressing the current absence of integrated assessment frameworks that allows contradictory practices to persist unchallenged.
- Establish structured national platforms for industry-academia knowledge exchange, enabling real-time transfer of cybersecurity research insights, resilience innovations, and sustainability practices from academic institutions into industrial policy, operational standards, and regulatory frameworks.
- Scale campus-as-living-laboratory models across Indian universities, creating a national higher education network actively contributing to local sustainability and resilience outcomes through student-led research, community engagement, and applied innovation programmes.
- Build cross-sectoral integrative planning frameworks linking energy, water, health, and agriculture resilience explicitly to sustainability goals, enabling coherent, co-benefit-maximising policy planning that avoids inadvertent trade-offs and advances Vision 2047 targets efficiently.

C5	Parisamvaad: Child Centric DRR 14.15 - 15.15 Parisamvaad Area
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Curator: *Bal Raksha Bharat*

Panellists:

- ***Grp. Capt.(Retd.) Shajahan Avadi, Indian Air Force***
- ***Mr Mintu Debnath, Head-Program Implementation, Bal Raksha Bharat***
- ***Ms. Ilma Mirza, Manager-Education, Bal Raksha Bharat***
- ***Mr. Naveen Shukla, Manager-Humanitarian and DRR, Bal Raksha Bharat***

Background: As climate risks intensify, integrating latest technological advances into national and state-level vulnerability and risk assessments can significantly enhance the precision, timeliness, and usability of climate information for adaptation planning. This session will explore how granular data, high resolution information and robust methods can support dynamic, data- driven assessments by combining climate projections, socio-economic datasets, and geospatial information to identify evolving risk patterns/trends. The discussion will focus on exploring robust frameworks for identifying key indicators of hazards, exposure, vulnerability, and adaptive capacity, enabling more transparent and comparable risk profiling across regions. It will also examine methods to translate global and national climate model outputs into district- and block-level actionable insights that align with state adaptation strategies and national climate priorities. A critical component of the dialogue will be assessing existing technical, institutional, and data capacity gaps within the country and identifying pathways through partnerships, digital infrastructure, and capacity building to strengthen the ability of governments to effectively utilize climate modelling outputs for informed adaptation decision-making.

Key Discussion Points

- Children are the most disproportionately impacted population in any disaster or climate-induced event. Building a resilient world for children is foundational to building a resilient society overall, as a world liveable for children is liveable for everyone.
- Defence children naturally develop resilience due to frequent relocations, cultural adaptability, and exposure to safety drills, demonstrating that structured environments and adult-led safety cultures significantly strengthen children's preparedness and confidence during emergencies.
- Save the Children's Safe Schools Approach operates on three pillars: Comprehensive School Safety, Violence-Free Schools, and Peace Schools, ensuring safety is prioritized

from the moment a child leaves home until they return, with zero learning loss and zero disaster-related deaths as the core mission.

- Family-level preparedness remains a critical and largely unaddressed gap. While preparedness exists at district, state, and national levels, individual household readiness, especially ensuring children know their SOPs during emergencies, needs urgent attention and a dedicated nationwide campaign.
- Institutional preparedness at Anganwadi centres is equally vital, as they serve the most vulnerable children. Ensuring Anganwadi workers understand emergency protocols and can continue life-saving services during disasters is essential to community-level resilience.

Innovations and Good Practices

- Save the Children collaborated with NIDM to develop a first-of-its-kind *Education in Emergencies* module, training multi-departmental personnel — not just teachers — reflecting the principle that child safety is a collective societal responsibility.
- DRR Clubs established in 35+ colleges across Jammu & Kashmir under JSDMA and RADRA provide monthly training toolkits to young adults, building grassroots disaster leadership aligned with the UGC mandate for two-credit DRR courses in higher education.
- In Himachal Pradesh, Save the Children partnered with CBRI and HSDMA to rebuild an entire flood-devastated village using scientific, child-friendly, low-cost construction — integrating retaining walls, drainage systems, school retrofitting, and Anganwadi retrofitting into a holistic resilience model.



Policy Insights

- The Government of India's Aapda Mitra programme is progressively building first-responder capacity down to the ground level. Integrating children formally into this framework as trained community first responders would significantly strengthen last-mile disaster response.
- Eco Clubs, mandated under the Government of India's LIFE Mission, offer a structured policy vehicle to build children's climate literacy, including accurate hazard vocabulary such as "heatwave", enabling them to become community champions beyond school walls.
- Save the Children's child-centric modules developed with NDMA and NIDM, covering child protection, WASH, hospital safety, and mental health/psychosocial support in

emergencies have trained over 5,000 government and non-government officials, embedding a child-sensitive lens into institutional disaster response systems.

Way Forward

- Scale child leadership models in DRR by identifying and training child champions at community level, mirroring the progression from community-centric to women-led to child-led resilience, enabling children to function as active responders alongside adults during emergencies.
- Leverage technology and partnerships with technical institutions like IITs to develop AI-based simulation exercises on local hazards, making preparedness programs relevant and engaging for the current tech-savvy generation of children and adolescents.
- Mainstream school safety as a non-negotiable, cross-cutting component across all school types ie. government and private - integrating life-saving skills such as first aid, CPR, and fire safety into regular curricula and mock drill schedules to build lasting safety muscle memory.
- Launch a national family preparedness campaign in partnership with government and civil society, providing every household, especially those with children and elderly with clear, scenario-based SOPs to bridge the critical gap between systemic and individual-level disaster readiness.



V038	Valedictory Session 16.25 - 17.45 Main Hall
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Session Curator: UPSDMA, DGFASLI, SSDMA, SEEDS, TU Dresden, ICARS-IIT Roorkee

Guests:

- **Lt. Gen. Yogendra Dimri (Retd.), Vice-Chairman, UP SSDMA**
- **Prof. V. K. Sharma, Vice-Chairman, SSDMA**
- **Prof. Kalachand Sain, Chairperson, Expert Committee-NMKSCC**
- **Dr. Anshu Sharma, Co-Founder, SEEDS**
- **Prof. Andre Lindner, MD-ABCD Centre, TU-Dresden**
- **Prof. Anil K. Gupta, ICARS-IIT Roorkee**

Context Setting

Prof. Anil Kumar Gupta, Director, ICARS-IIT Roorkee opened the valedictory by reflecting on the summit's journey across three days, from the Climate Knowledge Forum and launch of India's Climate Knowledge Network on Day 1, through regional vulnerabilities and health resilience on Day 2, to industry and safety on Day 3. He reported that over 45 partner organizations, 250 speakers, and 350 delegates had collectively made the summit a landmark science-policy-practice platform. He highlighted emerging institutional collaborations, a finalized programme with Deakin University on humanitarian leadership, an MOU being signed with UNU-CRIS positioning ICARS as a UNU hub, and interest from IUCN, UNDRR, and multiple international partners. He acknowledged the young team that had organized the summit on very short notice, openly sought feedback, and reaffirmed RESSUMMIT as an evolving process, not a one-time event.

"Disaster risk reduction is a collective goal and has to be achieved collectively. This summit led to dialogues on research, policy and practice and on cooperation, major joint research and ground actions have been taken up. We are always ready to partner, support and collaborate."

Remarks

Dr. Anshu Sharma, Sasakawa Award Awardee, Co-founder, SEEDS offered a reflective and intellectually engaging closing assessment, drawing on conversations both in sessions and corridors over three days. She identified two categories of insight that had emerged, things we know but struggle to translate into practice, and things we don't yet know, including vulnerabilities we haven't modelled. She illustrated the latter vividly through a Uttarakhand official's observation about increasing bear attacks in mid-range hills, possibly driven by

temperature-disrupted hibernation patterns, an anecdote that had no place in conventional hazard-vulnerability-exposure models. She praised the summit's rare mix of practitioners, researchers, students, and policymakers communicating in shared language, and emphasized that bridging attitudes and stakeholder relationships is as important as advancing technical knowledge.

"There were things that we don't even know that we don't know. How do we find vulnerabilities that are very complex and start bringing them into our models? REST Summit triggers a conversation that should grow and spread over the next two years till we convene again."

Remarks

Prof. Kalachand Sain, Chairperson, Expert Committee, National Mission for Strategic Knowledge on Climate Change offered a concise but substantive reflection on the summit's significance within India's broader climate science architecture. He observed that despite strong national programmes and institutional efforts, a communication gap persists between climate science, technology, innovation, policy, and implementation, preventing knowledge from translating into action. He praised ICARS's ADDRESS network portal as a critical step toward centralizing climate resilience data for researchers and policymakers. He acknowledged the complexity of India's diverse landscape, Himalayan, coastal, plains, and stressed that comprehensive, place-specific understanding is essential for building genuine climate resilience. He closed with a practical call for participants to convert the summit's knowledge wealth into concrete plans.

"After going back, we have got a plethora of knowledge. Let us try to understand how this knowledge can be translated into concrete plans, executable products and processes that will help build resilience and sustainability for Viksit Bharat 2047."

Remarks

Prof. Vinod Sharma, Vice Chairperson, Sikkim State Disaster Management Authority spoke about India's global leadership in disaster risk reduction, drawing on his experience working across Asian countries. He observed that India's institutional architecture, state and district disaster management plans, climate action plans at every level, and contributions from academic institutions beyond just IITs, represents remarkable national progress. He praised RESSUMMIT's unique value as a platform where civil society, academia, practitioners, and policymakers had genuinely engaged together, noting that 46 sessions were insufficient for the vast subject. He highlighted a significant CDRI report on loss and damage, with figures he described as "mind-boggling and horrifying," citing 3% of global GDP lost annually to natural disasters, as compelling evidence for resilience becoming a national mantra. He called for adding a "culture of resilience" to India's existing culture of preparedness.

"India is a leader in disaster risk reduction and climate resilience. This conference has given many new ideas to researchers about climate resilience. I will say this is a very good beginning, please continue it, because though it is not an easy thing, your small group has shown the capacity to do big things."

Special Remarks

Prof. André Lindner, Managing Director, ABCD Centre, Technical University of Dresden delivered a philosophical and forward-looking closing address centered on a single question: who will carry resilience forward? He argued that the future will be shaped not by frameworks or technologies but by the leaders institutions prepare today, leaders who combine technical competence with ethical imagination, systems thinking with humility, and global fluency with local responsibility. Drawing on TU Dresden's own change, converting exhausted open-pit mining areas into research hubs for circular economy and smart mobility, he demonstrated that universities must move beyond knowledge transfer toward co-creation and societal responsibility. He highlighted CIPSEM, TU Dresden's 50-year-old postgraduate programme with over 3,000 alumni from 150 countries, as a model of long-term, relational international partnership building resilience leadership. He closed with three memorable thoughts.

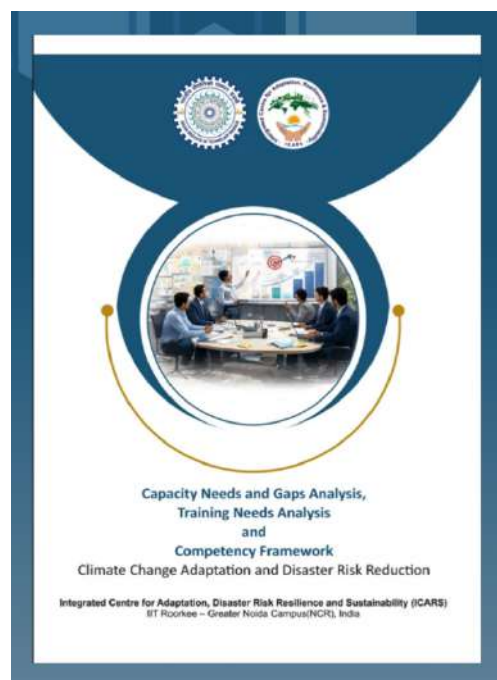
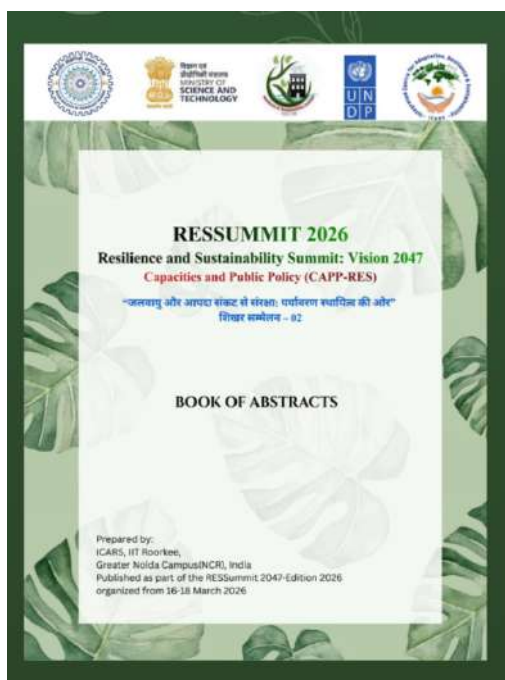
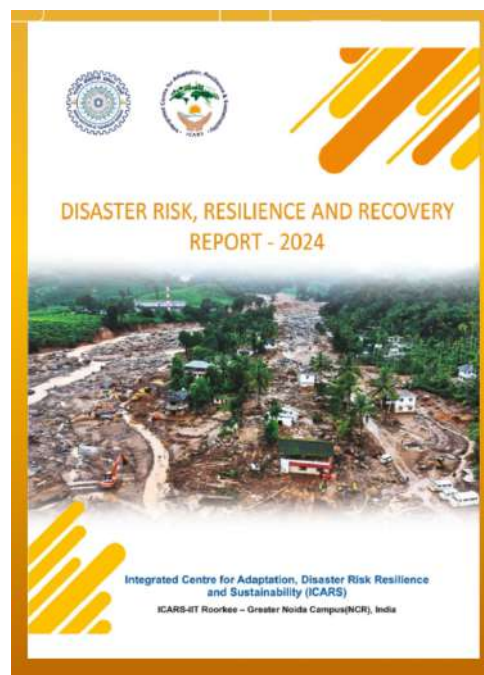
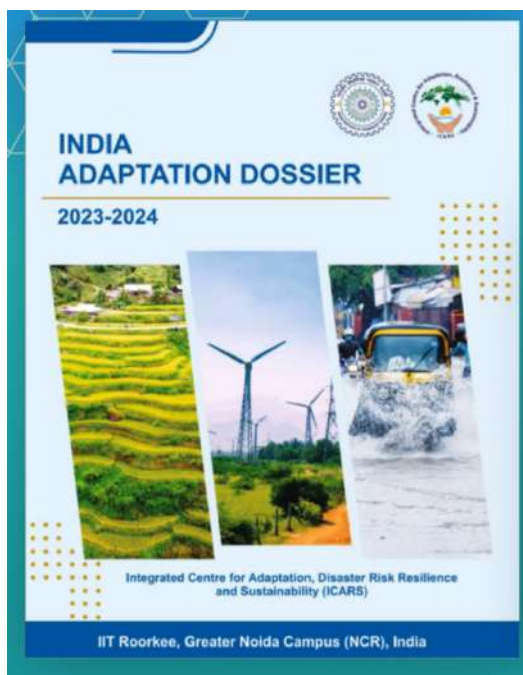
"The future of resilience depends on the leaders we cultivate today. Resilience without equity will not endure. Innovation without participation will not be trusted. International cooperation must not remain symbolic, it must become a lived practice of shared learning and shared institution building."

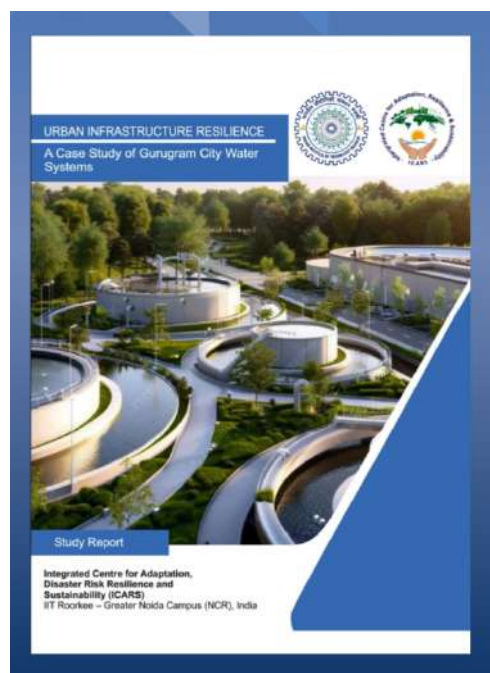
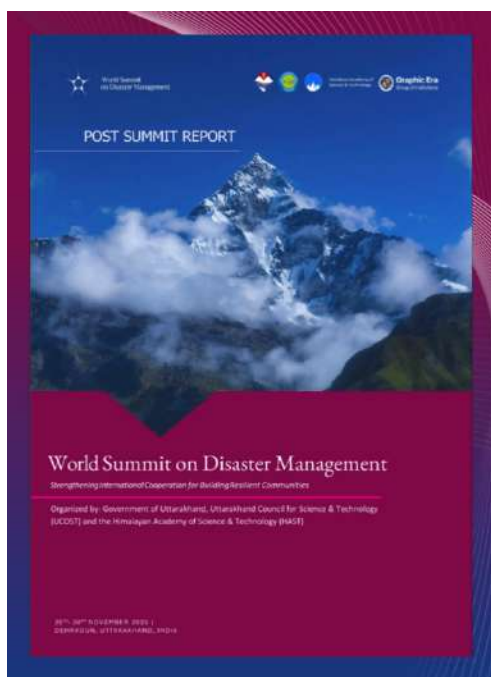
Valedictory Address

Lt. Gen. (Retd.) Yogendra Dimri, Vice Chairperson, Uttar Pradesh State Disaster Management Authority delivered one of the most comprehensive and candid addresses of the valedictory, opening with a vivid bear story from Rishiganga, where a flash flood had destroyed a rope bridge, trapping a mother bear and her cubs on the wrong side of the valley, causing what appeared to be human-wildlife conflict but was actually a cascade of the disaster itself. He used this to powerfully illustrate that disasters impact animals as well as people, and that apparent conflicts may have hidden climate-disaster root causes. He then offered a detailed account of Uttar Pradesh's change in disaster resilience, expanding Automatic Weather Stations from 100-150 to 2,500; deploying five new Doppler weather radars; creating multi-disaster response vehicles with 62 equipment types; building a state-of-the-art Emergency Operations Centre linked to districts; training 20,000 Aapda Mitras with another 30,000 in pipeline; mobilizing 2,000 women in 500 teams reaching 2,500 villages; conducting tehsil-level tabletop exercises thrice annually across hazard categories; and developing evidence-based, HBRCA-backed departmental and district disaster management plans. He connected conflict and climate explicitly, drawing attention to the Middle East crisis's cascading environmental and food security consequences as a reminder that disaster managers must engage with the full spectrum of human-driven catastrophe.

"The true success of this summit does not lie in the discussions and dialogues you've had, but in the partnerships you've built and the actions you will follow up with on ground. Disaster resilience, climate resilience and sustainability cannot be achieved by governments alone, it must be a whole-of-nation approach."

Release of Publications





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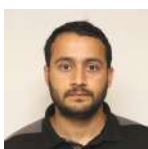
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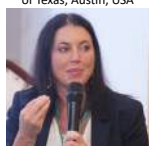
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