SAARC
Disaster Management Centre (IU)

Technical Proceedings

A Virtual Workshop on Enhancing Sustainability & Resilience of Water Infrastructure for Disaster Risk Reduction & Management in South Asia

March 25-27, 2025

Contents

Introduction

Background

South Asia, home to about 2 billion people, is one of the world's most disaster-prone regions, experiencing 39% of global disaster occurrences, with a majority linked to water-related hazards such as floods, droughts, cyclones, flash floods, landslides and water quality emergencies. Each year, floods affect over 120 million people in the region, causing economic losses exceeding $10 billion, while cyclones, particularly in coastal areas like the Bay of Bengal and Arabian Sea, result in damages of over $8 billion and threaten 80 million coastal residents. Droughts influence 40% of South Asia's agricultural land, placing the livelihoods of over 500 million people at risk and causing $7 billion in annual losses. Over the last two decades, water-related disasters have disproportionately affected vulnerable populations, with an estimated 1.8 billion people impacted. During droughts, the depletion of nearby water sources forces individuals to spend significantly more time, energy and money fetching water, while during floods, water contamination leads to 40% of children under the age of five suffering from waterborne diseases.

The damage to critical water infrastructure has been severe, with 95% of reported infrastructure losses in South Asia from 2010 to 2025 attributed to water-related disasters. This has reduced access to clean drinking water for over 400 million people annually, disrupted sanitation systems, and damaged irrigation infrastructure critical for food security. These challenges have significantly hindered progress toward SDG 6, with 29% of South Asians still lacking access to safely managed drinking water services and 45% without adequate sanitation in 2025. The region faces a growing climate resilience finance gap for water infrastructure, estimated at $50 billion annually, underscoring the urgent need for innovative financial solutions.

This virtual program seeks to address these critical challenges by bringing together stakeholders, including policymakers, disaster management practitioners, water resource experts, and international organizations. It aims to foster knowledge sharing, promote regional collaboration, and advocate for innovative policies to enhance water infrastructure resilience. By creating actionable pathways to mitigate water-related disaster risks, the program will help safeguard communities, strengthen regional cooperation and accelerate progress toward sustainable development in South Asia.

Aim and Objectives:

The aim of the workshop is to bring together key stakeholders from SAARC Member States to share knowledge and insights on the challenges posed by water-related

disasters such as floods, droughts, and cyclones. The workshop will focus on enhancing the resilience of water infrastructure in the region, fostering regional collaboration and discussing the urgent need for innovative policies and financial solutions to address the impact of these disasters on communities and infrastructure.

The primary objectives of this workshop are;

- Provide participants with in-depth knowledge of the region's vulnerability to water-related hazards, their impacts on communities and cascading effects on critical infrastructure.
- Explore innovative solutions, including structural and non-structural measures such as nature-based solutions, climate-resilient design and retrofitting existing systems.
- Foster dialogue among South Asian nations to address transboundary water-related challenges and promote joint disaster risk reduction strategies.
- Discuss barriers such as inadequate regulatory frameworks, institutional capacity and enforcement mechanisms.
- Share success stories, case studies and global examples to inspire local and regional solutions for improving water infrastructure resilience.
- Identify and advocate for innovative financing models like public-private partnerships, green bonds and resilience funds to close the water infrastructure financing gap in South Asia.

Workshop Overview

The SAARC Disaster Management Centre (IU), Gandhinagar had organized a virtual workshop on '**Enhancing Sustainability & Resilience of Water Infrastructure for Disaster Risk Reduction & Management in South Asia**' on 25-27 March 2025 for the SAARC Member States.

The workshop was attended by 48 officials from six SAARC member states—Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka. These participants represented various key Offices/ organisations, including National Disaster Management Authorities, Disaster Response Forces, ministries responsible for Water Supply, Climate Change, Environment, Housing, and Urban Affairs, etc. in their respective countries.

The sessions were conducted by international experts, academicians and development organizations, offering a balanced mix of theory and practical insights. They included technical discussions and case studies from the South Asian region. On the final day, participating countries presented their good practices, shared challenges and discussed solutions implemented to enhance the sustainability and resilience of water infrastructure.

This Report contains details of the proceedings carried out during the course of the Workshop. The detailed agenda of the workshop and the list of participants is given as Annexure 1 and Annexure 2 respectively.

Proceedings of the Sessions

Inaugural Session

Mr. Nisarg Dave, I/c Specialist, SDMC (IU) welcomed all the participants to the three-day virtual workshop on 'Enhancing Sustainability & Resilience of Water Infrastructure for Disaster Risk Reduction & Management in South Asia'.

Dr. Rajiv Kumar Gupta, Director, SDMC (IU), delivered the keynote address, underscoring the critical need for a collective approach to disaster risk reduction. He stressed the importance of transboundary collaboration in managing water-related challenges, particularly in a region where water resources are shared across multiple nations. Dr. Gupta highlighted the increasing frequency and intensity of water-related disasters such as floods, droughts, and cyclones, which pose severe risks to lives, livelihoods, and infrastructure.

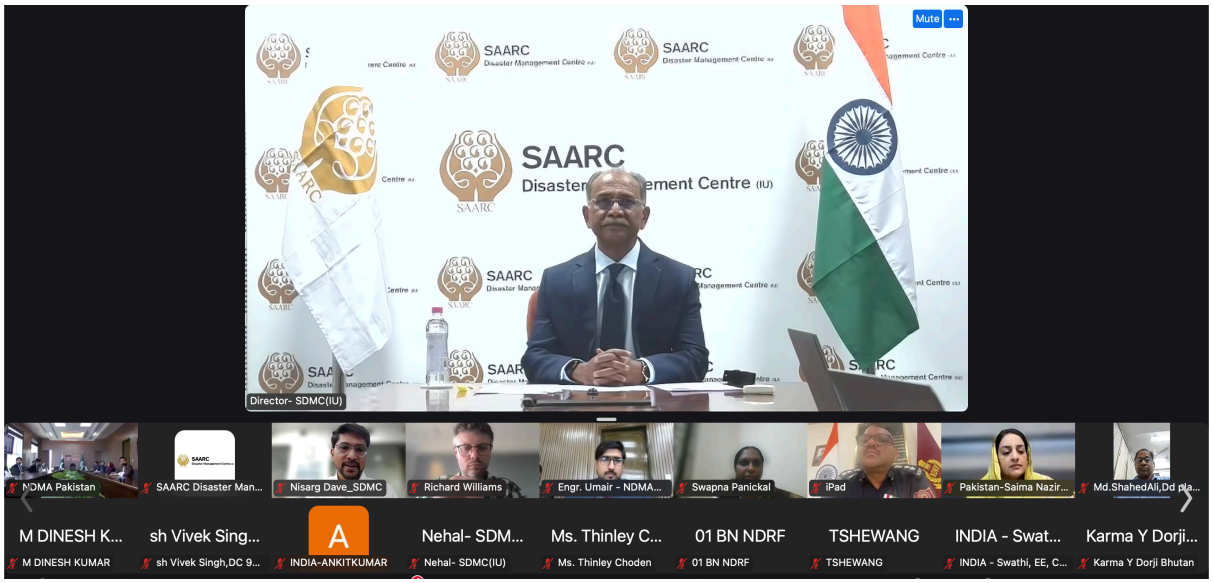

Figure 1 Director, SDMC (IU) and delegates from SAARC Member States during the group photo. Dated on 25th March 2025

He urged SAARC member states to work together in strengthening policy frameworks, technological innovations, and community-based initiatives to mitigate disaster risks. Dr. Gupta emphasized that sustainable water infrastructure is crucial for disaster resilience, economic stability, and long-term development in South Asia.

Acknowledging the support of the SAARC Secretariat, he expressed gratitude for its role in facilitating such regional initiatives. He also extended appreciation to the governments of the participating countries for their commitment and engagement in this crucial dialogue.

Dr. Gupta concluded by expressing optimism about the workshop's outcomes, looking forward to fruitful discussions, exchange of good practices, and the formulation of actionable strategies that will contribute to a more resilient and sustainable South Asia.

Following the Inaugural Session, the workshop proceeded with a series of technical sessions and case studies, fostering an engaging and insightful learning experience. Participants demonstrated keen interest, making the workshop a valuable platform for deliberate discussions, knowledge exchange and collaboration. The interactive nature of the sessions encouraged the sharing of diverse perspectives and good practices across the SAARC region.

Technical Sessions

1. Changing Climate: Need for Sustainable & Resilient Water Infrastructure
Dr. Swapna Panickal, Centre for Climate Change Research, Indian Institute of Tropical Meteorology

Dr. Swapna's presentation centered on the growing global water stress, a phenomenon intricately linked to climate change and human activities. She began by highlighting the geographical distribution of water-stressed regions using a world map, emphasizing the role of increasing population and demands in exacerbating this issue.

- **Climate Change as a Primary Driver:**
    - Rising global temperatures, particularly in oceans, lead to detrimental effects like coral bleaching, algae blooms and eutrophication.
    - The amplified greenhouse effect, driven by higher concentrations of greenhouse gases, further accelerates this warming trend.

The impact of temperature changes extends to precipitation patterns. With rising surface temperatures, there's a significant increase in atmospheric moisture content, roughly by ~24% during 1886-2095 over the Indian subcontinent. Simultaneously, a reduction in vertical wind shear creates an environment conducive to localized convection, resulting in an increased frequency of extreme precipitation events. This

relationship between temperature and atmospheric moisture is essentially exponential, meaning even small temperature increases can result in large moisture shifts.

- **Monsoon Variability and Research Efforts:**
    - A 152-year analysis (1871-2023) of all-India monsoon rainfall reveals a concerning trend: an increased frequency of monsoon droughts in the latter half of the period.
    - The Centre for Climate Change Research (CCCR) at IITM, Pune, is at the forefront of addressing these climate challenges.
    - Using the IITM Earth System Model (IITM-ESM), researchers aim to assess long-term global and regional climate changes, specifically focusing on the Indian subcontinent.
    - The objective is to create a Climate Services Information System to better deal with the increasing climate extremes.

The increasing global temperature is projected to intensify the hydrological cycle, leading to more frequent and severe extreme events. This underscores the urgent need for sustainable and resilient water infrastructure. Ultimately, mitigation measures are crucial for reducing the magnitude of global warming's impact on water resources, thereby minimizing the necessity for extensive adaptation efforts.

2. How can we work with the river? Infrastructure, river dynamics and nature-based solutions

Prof Richard Williams School of Geographical & Earth Sciences, University of Glasgow, United Kingdom

The discussion focused on geomorphology, riverscapes and nature-based solutions for managing Philippine rivers. It highlighted how natural factors, ecology and human activities—such as quarrying and flood control—shape river forms. The Bucao River, Cagayan River and Abulug River were presented as examples of meandering rivers affected by these factors. The Philippines has high river diversity, with almost all channel planform patterns present, making classification and management complex. Understanding river planform mobility and the interaction of geomorphic processes is crucial for sustainable river management.

A nature-based approach was emphasized, advocating for working with rivers rather than controlling them. The use of satellite data was suggested as a low-cost method

to monitor river migration and assess risks to critical infrastructure like bridges and roads. The discussion also stressed the importance of respecting river diversity, assessing river conditions and integrating emerging technologies for effective river governance.

Key Messages from the session are as follows

- Rivers should be worked with, not controlled.
- Each river is unique; its natural diversity must be respected.
- Rivers are interconnected systems; upstream actions affect downstream conditions.
- Investing in prevention saves lives and reduces recurring damage.
- Local communities are knowledge holders, not just stakeholders.
- Long-term planning is crucial for sustainable river management.
- Collaboration and continuous learning are key to building capacity.

3. Compatible fusion of nature-based & innovative solutions for improving resilience of water infrastructure

Prof. Trevor Hoey Pro Vice-Chancellor International & Sustainability, Brunel University of London

The session covered several key concepts related to environmental management and sustainable development. Prof. Hoey introduced Brunel University London and highlighted Isambard Kingdom Brunel's significant engineering contributions. The focus then shifted to river restoration, outlining four main types: full restoration, rehabilitation, enhancement and creation, with examples provided from Singapore's Kallang River and Scotland's Culbin dunes. The importance of Natural Flood Management (NFM) was emphasized, stressing the need for innovative, scalable and holistic approaches that consider physical, biological, economic and social factors. The scale of intervention should match the problem and transparent communication about synergies and trade-offs is crucial.

The presentation then delved into the identification of Sustainable Development Goal interlinkages using the DPIR framework, combining literature review, stakeholder consultation and expert judgment. A case study from the Luanhe River basin illustrated the complexities of upstream-downstream interactions, specifically the trade-offs between economic benefits from cage aquaculture and the resulting water pollution impacting downstream regions. The abrupt ban on aquaculture highlighted

the importance of considering long-term environmental impacts and socioeconomic consequences in policy decisions.

The overall conclusions reiterated the need for innovative, integrated, and scalable responses to climate change, emphasizing the importance of understanding and managing synergies and trade-offs through effective communication and consultation.

4. Aging Water Infrastructure: The Need for Redundancy in Water Systems

Dr. Ranjana Ray Chaudhari, Coca-Cola Department of Regional Water Studies TERI School of Advanced Studies

Dr. Chaudhari highlighted the critical challenges posed by outdated water infrastructure in rapidly urbanizing regions. It emphasized the increasing demand for water due to urban population growth and the strain on existing treatment and distribution systems. Key concerns included the deterioration of dams, declining groundwater levels, rising seawater intrusion and the need for frequent maintenance and monitoring. The presentation underscored the importance of sustainable water management practices, such as treated wastewater reuse, groundwater aquifer management and flood mitigation strategies through green-blue infrastructure. Case studies, including urban watershed restoration projects, showcased successful interventions that enhanced water resilience. A circular economy approach to water management was proposed, advocating for efficient use, conservation and infrastructure modernization to ensure long-term sustainability. The discussion reinforced the urgent need for policy reforms, technological integration and regional collaboration to secure water resources for future generations.

Case Studies

Case Study 1: Building Climate Resilient Water Infrastructure in South Asia

Dr. M. Dinesh Kumar, Executive Director, Institute for Resource Analysis and Policy

Dr. Kumar presented the critical need for climate-resilient water infrastructure in South Asia by contrasting it with conventional systems that are vulnerable to extreme hydrological events. He emphasized that resilient infrastructure must be capable of functioning under unpredictable and extreme conditions, such as consecutive droughts or unprecedented floods, which are becoming more frequent due to climate change.

Key factors affecting resilience included the predictability of weather patterns, water availability in aquifers and reservoirs and the region's precipitation patterns, which exhibited high spatial and temporal variability.

To enhance resilience, the presentation suggested adopting strategies such as utilizing long-term historical hydrological data for infrastructure design, ensuring a dependable water supply through multi-annual reservoir storage and implementing groundwater banking. Additionally, linking reservoirs and transferring water between regions with varying availability were proposed as solutions to help balance demand and supply. The presentation concluded that no single solution existed; instead, a combination of improved hydrological understanding, sustainable water management practices, and region-specific adaptations was required to build truly climate-resilient water systems.

Case Study 2: From Water Scarcity to Water Security: Gujarat's Water Infrastructure Development

Dr. M B Joshi, Consultant GIDM

Dr Joshi highlighted Gujarat's remarkable transformation from severe water scarcity to water security through strategic infrastructure development and disaster resilience measures. It showcased the state's efforts in ensuring sustainable water management and the role of innovative projects in achieving this goal.

Gujarat had faced extreme water shortages in the past, leading to water riots, long queues for domestic water and mass migration of both people and livestock in search of water. Women in rural areas endured the burden of traveling kilometers daily to fetch water. Additionally, poor water quality resulted in severe health issues such as dental and skeletal fluorosis, posing a major public health crisis.

To address this crisis, Gujarat implemented significant infrastructure development projects, positioning itself as India's leading state in water management, with a Composite Water Management Index score of 76, as recognized by NITI Aayog. The Sardar Sarovar Project on the Narmada River played a crucial role in this transformation, boasting a 7.7 MAF gross storage capacity and an extensive 69,497 km canal network, which efficiently distributed water across the state.

A major breakthrough in Gujarat's water management was the creation of manmade perennial rivers and large-scale inter-basin water transfer projects. The state established a robust network of pumping stations to lift water to drought-prone

regions like Saurashtra, ensuring a reliable supply of water through a 600 km water transfer infrastructure. These efforts greatly reduced water scarcity and provided a reliable water source for millions.

In addition to large infrastructure projects, Gujarat championed water conservation initiatives. The SAUNI Yojana linked 1,371 km of canals to existing 115 dams, ensuring better water distribution. The Sujalam Sufalam Spreading Canal Project diverted excess floodwater to water-stressed regions, further addressing scarcity. Moreover, the state invested in desalination plants along its coastline, enhancing water availability. Rainwater harvesting and groundwater recharge programs, including the construction of 1.9 lakh check dams and the rejuvenation of 2,650 Amrit Sarovar (water bodies), played a vital role in replenishing natural water sources.
Gujarat's achievements in urban and rural water security were evident, with 90% of rural Gujarat gaining access to individual tap water connections. The successful Sabarmati Riverfront project transformed a once-dry riverbed into a thriving water body. Additionally, groundwater levels significantly improved, benefiting agriculture and drinking water supply.

Case Study 3: Community Led Traditional Practices with proven Resilience against Disasters

Dr. Anurag Danda, Director & Lead- Sundarbans Program, WWF-India

The presentation focused on community-led practices for enhancing resilience against disasters in the Sundarbans, India. He highlighted the critical water infrastructure in the region, particularly embankments and freshwater ponds, which serve as essential resources for the local population. The embankments, spanning approximately 1,800km across 35 inhabited islands, have been in place since the late 18th century, while freshwater ponds exist as both public and private properties for domestic use.
He discussed the disaster risks associated with this infrastructure, emphasizing how toe-line erosion and vertical collapse due to tidal action, as well as overtopping during storm surges, have made embankments vulnerable. Similarly, freshwater ponds often face inundation during such extreme weather events, threatening water security for local communities. As a mitigation strategy, he presented dedicated freshwater ponds for domestic use, which have been protected from storm surges to ensure a sustainable supply of potable water. The case study underscored the importance of community participation in disaster preparedness and infrastructure resilience,

advocating for nature-based solutions and adaptive water management practices in the face of climate change.

Case Study 4: Advancing Climate Resilience of Water Sector in Bhutan
Ms. Thinley Choden, Principal Engineer, Water and Sanitation Division, Department of Infrastructure Development, Ministry of Infrastructure and Transport, Bhutan

Ms. Choden provided an in-depth analysis of the challenges and strategies for ensuring sustainable and resilient water infrastructure in Bhutan. She outlined how Bhutan's unique topography, extreme weather conditions and dependency on glacier-fed rivers had made water resource management particularly complex. She emphasized that climate change had exacerbated existing vulnerabilities, leading to glacier retreat, erratic monsoons, flash floods and seasonal water shortages. These factors had not only affected water availability but also posed risks to critical water infrastructure, threatening the livelihoods of local communities.

To address these pressing issues, she highlighted various adaptation measures undertaken in Bhutan. These included integrated watershed management programs, which focused on maintaining the health of water sources through afforestation, soil conservation and sustainable land-use practices. She also discussed community-led conservation initiatives, where local stakeholders were actively involved in managing and protecting water sources to ensure long-term availability. Additionally, she spoke about disaster risk reduction strategies, such as the implementation of early warning systems for floods and landslides, the development of climate-resilient water supply systems, and the promotion of cross-sector collaboration between government agencies, research institutions, and local communities.

Ms. Choden stressed the critical role of policy-driven interventions in enhancing water security and infrastructure resilience. She advocated for the integration of climate risk assessments into national planning, as well as the adoption of innovative technologies to improve water storage, distribution and conservation. Her presentation reinforced the idea that building a sustainable and resilient water management framework required a multi-stakeholder approach, ensuring that both traditional knowledge and modern scientific methods were effectively combined to mitigate climate-induced water challenges in Bhutan.

Country Presentations

Country-Specific Challenges and Solutions for Enhancing Sustainability and Resilience of Water Infrastructure

A key segment of the workshop focused on country-specific challenges and solutions in enhancing the sustainability and resilience of water infrastructure across South Asia. Experts and representatives from Bangladesh, Bhutan, India, Pakistan and Sri Lanka shared their insights, highlighting critical water management issues, disaster risks and adaptive strategies undertaken in their respective countries.

Bangladesh

Dr. Md. Sazzad Hossain, Superintending Engineer at the Hydroinformatics and Flood Forecasting Circle, Bangladesh Water Development Board, presented Bangladesh's challenges in managing floods, river erosion and salinity intrusion due to rising sea levels. He emphasized the importance of real-time flood forecasting and early warning systems to mitigate disaster impacts. Additionally, Bangladesh has been implementing embankment reinforcement projects, integrated water resource management (IWRM) and adaptive infrastructure planning to address its vulnerabilities.

Bhutan

Mr. Mahesh Pradhan, Specialist at the Department of Infrastructure Development (DoID), Ministry of Labour and Human Resources (MoLT), highlighted Bhutan's dependency on glacial-fed rivers and the growing risks of Glacial Lake Outburst Floods (GLOFs). He discussed Bhutan's efforts in hydropower resilience planning, early warning systems for GLOFs and sustainable watershed management to protect both infrastructure and communities from extreme hydrological events.

India

Mr. Antony Joh Moothedan, Project Associate (Urban Flood) at the National Disaster Management Authority (NDMA) of India, focused on flood management challenges and the increasing frequency of extreme rainfall events leading to waterlogging and drainage congestion in cities. He outlined India's strategies, including the development of climate-resilient urban planning policies, restoration of natural drainage systems and investments in smart water infrastructure, such as real-time monitoring systems and flood forecasting technologies.

Pakistan

Ms. Saima Nazir, Deputy Director (Research & Policy) at the Ministry of Climate Change & Environmental Coordination, along with **Mr. Umair Afzal** from the National Disaster Management Authority, discussed Pakistan's water scarcity issues, inefficient water distribution and increasing flood risks. They stressed the impact of climate change on Pakistan's water security and highlighted initiatives such as rainwater harvesting, the development of resilient irrigation systems, and strengthening flood protection infrastructure. They also emphasized the importance of policy reforms and regional cooperation in ensuring sustainable water management.

Sri Lanka

Ms. Udya Madhavi Abeysinghe, Assistant Director (Preparedness) at the Disaster Management Centre of Sri Lanka, highlighted the country's challenges related to droughts, flash floods and inefficient water storage systems. She presented Sri Lanka's approach to community-based water conservation programs, groundwater recharge initiatives, and the rehabilitation of traditional water storage tanks (wewas) to improve water security. Additionally, she underscored the importance of integrating disaster risk reduction (DRR) into national water management policies to build long-term resilience.

Key Takeaways

The country presentations provided a comprehensive overview of the diverse water-related challenges in South Asia, along with the innovative approaches being adopted to enhance sustainability and resilience. While each country faces unique hydrological and climatic challenges, common themes emerged, such as the need for:

- **Improved early warning systems and flood forecasting technologies**
- **Sustainable and adaptive water infrastructure**
- **Enhanced regional cooperation and policy reforms**
- **Integration of climate resilience into water management strategies**

The discussions reinforced the importance of knowledge sharing, technological advancements and collaborative efforts among SAARC member states to strengthen regional resilience in water infrastructure management.

Closing Session

The Director of SAARC Disaster Management Centre (IU) delivered the closing remarks, marking the successful conclusion of the Virtual Workshop on 'Enhancing Sustainability & Resilience of Water Infrastructure for Disaster Risk Reduction & Management in South Asia' on March 27, 2025. He expressed his appreciation to all distinguished speakers, experts, and participants for their active engagement and insightful contributions throughout the three-day workshop.

He emphasized the critical role of regional collaboration in addressing the shared challenges posed by climate change, water-related disasters and infrastructure vulnerabilities in South Asia. He highlighted the importance of integrating scientific knowledge, policy-driven solutions and community-based approaches to build resilient and sustainable water systems across the SAARC Member States.

The Director acknowledged the valuable discussions on good practices, challenges, and innovative solutions presented by the experts and the participants the member states. He reaffirmed SDMC (IU)'s commitment to supporting SAARC nations in their disaster risk reduction efforts and encouraged continuous dialogue and collaboration to build a more resilient and water-secure South Asia. He extended his gratitude to the SAARC Secretariat, national governments, expert speakers and development organizations for their support in making the workshop a success and looked forward to future initiatives that would further strengthen disaster resilience in the region.

Annexure 1 - Program Agenda

Day 1: 25th March 2025 (Tuesday)

Time	Topic	Speakers
10:30 - 11:00	**Welcome and Inaugural Session** • Welcome • Participant introduction • Inauguration and Introduction to the workshop	**Dr. Rajiv Kumar Gupta,** Director SDMC (IU)
11:00 - 11:30	**Session 1: Changing Climate: Need for Sustainable & Resilient Water Infrastructure** • Vulnerability of South Asia from disasters point of view and the crucial role of Water Infrastructure in achieving SDGs • Projected impacts of population growth and climate change on water resources in South Asia • Recent disasters and consequences on Water Infrastructure: impacts, responses, and lessons learned	**Dr. Swapna Panickal** Centre for Climate Change Research, Indian Institute of Tropical Meteorology
11:30 - 12:00	**Case Study 1: Building Climate Resilient Water Infrastructure in South Asia**	**Dr. M. Dinesh Kumar** Executive Director, Institute for Resource Analysis and Policy
12.00 - 12.30	**Session 2: How can we work with the river? Infrastructure, river dynamics and nature-based solutions** • Design and construction: building resilient infrastructure • Maintenance and upkeep: regular maintenance to prevent deterioration. • Redundancy and backup systems: having backup systems in place to ensure continuity. • Monitoring and sensing: using sensors and monitoring systems to detect potential issues. • Regulatory Frameworks and Polices • Key Barriers to Resilient Water Infrastructure	**Prof Richard Williams** School of Geographical & Earth Sciences, University of Glasgow, UK

Day 2: 26th March 2025 (Wednesday)

Time	Topic	Speakers
10.45 - 11.15	**Session 3: Compatible fusion of Nature-based & Innovative Solutions for improving resilience of Water Infrastructure** • Restoring wetlands, mangroves, and forests to mitigate flood and drought risks. • Sponge City: Concepts to Performance • Asset management: prioritizing maintenance and upgrades based on risk and criticality. • Risk assessment and management: identifying potential risks and developing mitigation strategies. • Investing in new technologies such as smart water grids and green infrastructure. • Collaboration and information sharing with other utilities and stakeholders. • Community engagement and education	**Prof Trevor Hoey** Pro Vice-Chancellor International & Sustainability, Brunel University of London
11.15 - 11.45	**Session 4: Aging Water Infrastructure: The Need for Redundancy in Water Systems** • Dependability of age old Water supply systems (reservoirs, dams, aqueducts, conveyance & distribution network), Wastewater treatment plants, Storm-water management systems, Irrigation systems, Drinking water treatment plants • Identifying Risks and Developing Mitigation Strategies • Asset Management with the use of GIS, remote sensing and AI, IoT, Data Analytics, SCADA etc. • Water infrastructure inspection and maintenance • Major Desilting required in Dams and Canals	**Dr. Ranjana Ray Chaudhari** Coca-Cola Department of Regional Water Studies TERI School of Advanced Studies
11.45 – 12.15	**Case Study 2: From Water Scarcity to Water Security: Gujarat's Water Infrastructure Development**	**Dr. M B Joshi** Consultant GIDM
12.15 – 12.45	**Case Study 3: Community Led Traditional Practices for Resilience against Disasters**	**Dr. Anurag Danda,** Director & Lead-Sundarbans Program, WWF-India

Day 3: 27th March 2025

Time	Topic	Speakers
10.45 - 11.15	**Case Study 4: Advancing Climate Resilience of Water Sector in Bhutan (ACREWAS)**	**Ms. Thinley Choden,** Ministry of Infrastructure and Transport, Bhutan
11.15 - 13.15	**Country Specific Challenges and Solutions for Enhancing Sustainability and Resilience of Water Infrastructure**	**Representatives of SAARC Member States**
	1. Bangladesh	*Dr. Md. Sazzad Hossain*
	2. Bhutan	*Mr. Mahesh Pradhan*
	3. India	*Mr. Antony Joh Moothedan*
	4. Pakistan	*Ms. Saima Nazir and Mr. Umair Afzal*
	5. Sri Lanka	*Ms. Udya Madhavi Abeysinghe*
13:15 – 13:30	**Closing Ceremony** • Wrap up & Closing remarks	**Dr. Rajiv Kumar Gupta,** Director SDMC (IU)

Annexure 2 - List of Participants

#	Country Name	Flag	Participant's Name	Designation	Department
1	Bangladesh		Mr. Abdus Sobhan	Deputy Director (Planning)	DDM
2	Bangladesh		Mr. Dilip Kumar Saha	Deputy Director (MIM)	DDM
3	Bangladesh		Mr. Dr. Sazia Afreen	Dhaka Wasa	
4	Bangladesh		Mr. Abul Kalam Mallik,	Meteorologist	BMD
5	Bangladesh		Mr. Shahed Ali	Deputy Director (Planning)	Fisheries Department
6	Bangladesh		Mst, Salma Akter	Assistant Director	Fisheries Department
7	Bangladesh		Dr. Md. Sazzad Hossain	Superintending Engineer	Hydro informatics and Flood Forecasting Circle, Bangladesh Water Development Board
8	Bhutan		Mr. Sonam Gyelpo	Sr. Environment Officer	DECC, MoENR
9	Bhutan		Mr. Pem Dorji Tamang	Asst. Environment Officer	DECC, MoENR
10	Bhutan		Mr. Nidup Dorji	Asst. Environment Officer	DECC, MoENR
11	Bhutan		Mr. Mahesh Pradhan	Specialist	DoID, MolT
12	Bhutan		Mr. Sonam Tshewang	Executive Engineer	DLGDM, MoHA
13	Bhutan		Ms. Karma Yangzom Dorji	Environmental & Social Expert	DLGDM MoHA
14	Bhutan		Ms. Dezangmo	Programme Officer	DLGDM, MoHA
15	Bhutan		Mr. Tandin Wangchuk	Assistant Programme Officer	DLGDM MoHA
16	India		Dr. Sweta Baidya	Sr. Consultant (Cyclone)	National Disaster Management Authority

#	Country Name	Flag	Participant's Name	Designation	Department
17	India		Ms. Dipali Jindal	Sr. Consultant (Landslide),	National Disaster Management Authority
18	India		Mr. Antony Joh Moothedan	Project Associate (Urban Flood),	National Disaster Management Authority
19	India		Mr. Suneel Kumar Singh	Commandant	9th Battalion National Disaster Response Force
20	India		Mr. Hitender Pal Singh Kandari	Commandant	1st Battalion National Disaster Response Force
21	India		Dr. Sandeep Pandey	Associate Professor cum Program Manager	Gujarat Institute of Disaster Management
22	India		Mr. Ankit Rathod	Training Specialist cum Program Manager	Gujarat Institute of Disaster Management
23	India		Mr. Anurag Kumar	EE (DM)	Ministry of Housing & Urban Affairs
24	India		Mr. D.B. Gupta	EE (DM)	Ministry of Housing & Urban Affairs
25	India		Mrs. Swathi Krishnamurthy	EE (Civil)	Ministry of Housing & Urban Affairs
26	India		Mr. Mrinal Dewangan	AEE (Civil)	Ministry of Housing & Urban Affairs
27	India		Mr. A P Jacob Manohar	Associate TCP	Ministry of Housing & Urban Affairs
28	India		Mr. Anshul Abbasi		Ministry of Housing & Urban Affairs
29	Nepal		Mr. Man Bahadur Budha	Section Officer	Ministry of Home Affairs
30	Nepal		Mr. Deepak Kumar Acharya	Section Officer	Ministry of Home Affairs
31	Nepal		Mr. Ram Prasad Ghimire	Senior Divisional Engineer	Ministry of Water Supply

#	Country Name	Flag	Participant's Name	Designation	Department
32	Nepal		Ms. Anjana Maharaj	Senior Divisional Engineer	Ministry of Water Supply
33	Nepal		Mr. Rajendra Sharma	Under Secretary	Ministry of Home Affairs
34	Nepal		Mr. Ram Bahadur K.C.	Under Secretary	Ministry of Home Affairs
35	Nepal		Mr. Krishna Prasad Rijal	Senior Divisional Engineer	Ministry of Energy, Water Resources and Irrigation
36	Pakistan		Ms. Saima Nazir	Deputy Director (Research & Policy),	Ministry of Climate Change & Environmental Coordination
37	Pakistan		Mr. Muhammad Irfan		National Disaster Management Authority
38	Pakistan		Dr. Shazia Akhtar	Deputy Manager,	National Disaster Management Authority
39	Pakistan		Mr. Abbas Zakir Qasim	Deputy Manager,	National Disaster Management Authority
40	Pakistan		Mr. Waleed Jamal		National Disaster Management Authority
41	Pakistan		Mr. Abdul Hanan Hamid		National Disaster Management Authority
42	Pakistan		Mr. Amar Jalil		National Disaster Management Authority
43	Pakistan		Mr. Umair Afzal		National Disaster Management Authority
44	Pakistan		Engr. Muhammad Nawaz Sharif	Assistant Manager	National Disaster Management Authority
45	Pakistan		Mr. Muhammad Amjhad	Assistant Manager	National Disaster Management Authority
46	Pakistan		Mr. Muhammad Saad Khan		National Disaster Management Authority

#	Country Name	Flag	Participant's Name	Designation	Department
47	Pakistan		Mr. Ali Hassan		National Disaster Management Authority
48	Sri Lanka		Ms. Udya Madhavi Abeysinghe	Assistant Director (Preparedness)	Disaster Management Centre

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