Ministry of Housing and Urban Affairs
Government of India

PARVAT-MANTHAN

Gates Foundation

National Institute of Urban Affairs

Insights Document

Parvat-Manthan
Regional Conclave

Dialogue for Enhanced Service Delivery in Water, Used Water and Waste Management for Hill Cities

India Habitat Centre, New Delhi | 3rd to 4th December 2024

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Discover key insights from the Parvat-Manthan Regional Conclave in this detailed report.

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Acknowledgments

The National Institute of Urban Affairs (NIUA) sincerely acknowledges the support provided by the Ministry of Housing and Urban Affairs and the Gates Foundation in the endeavour for Water, Sanitation, and the Climate Change Nexus for Clean and Sustainable Hill States.

We extend our gratitude to the International Centre for Integrated Mountain Development (ICIMOD), the National Faecal Sludge and Septage Management Alliance, Bremen Overseas Research and Development Association (BORDA) - South Asia, the Federal Ministry for Economic Cooperation & Development, Germany, Integrated Mountain Initiative (IMI) and Environmental and Public Health Organisation (ENPHO) for their support in conducting the regional conclave, held from December 3rd to 4th, 2024, at the India Habitat Centre, New Delhi, under the umbrella of the hill forum, Parvat-Manthan.

We are grateful to all the participants, eminent speakers, and delegates who contributed to the success of the Parvat-Manthan Regional Conclave on 'Dialogue for Enhanced Service Delivery in Water, Used Water, and Waste Management for Hill Cities'. The conclave brought together urban development departments from North and Northeast India, Nepal and Bhutan; 5 international development organisations, 19+ government bodies, and 28+ non-governmental organisations (NGOs) and Community Based Organisations (CBOs); together under one roof in the Regional Parvat-Manthan Conclave, with the aim to strengthen the service functions of City-Wide Inclusive Sanitation (CWIS) principles across the Himalayas.

The conclave served as a vital platform for addressing the pressing issues of water scarcity, climate resilience, and sustainable liquid and solid waste management in the unique context of the Himalayan region, spanning India, Nepal and Bhutan. We are deeply appreciative of the experts, policymakers, and stakeholders who engaged in rich discussions on integrated water resource management, decentralised sanitation, and climate-sensitive water and waste management strategies, along with innovative technologies and finance mechanisms across these domains. The valuable insights shared by our distinguished conclave attendees shall pave the way for actionable solutions in hill cities across regional levels.

We are also grateful for the participation of students and young professionals who showcased their innovative research through poster presentations. Their involvement underscores the importance of youth engagement in shaping sustainable development in the region. A special thanks to the private sector participants whose technological innovations in water and waste management demonstrated the potential for climate-resilient solutions. Their contributions allow for technological solutions to address the region's environmental challenges.

The conclave has successfully facilitated knowledge exchange, fostered cross-sectoral collaboration, and highlighted key actionable insights to ensure a climate-resilient and sustainable future for Himalayan communities. We look forward to continuing these pertinent dialogues and catalysing collaborations to safeguard the socio-ecological resilience of the Himalayas for future generations.

Thank you!
National Institute of Urban Affairs

Agenda

DAY 1: VISION FOR A WATER-WISE HIMALAYA

9:30-10:00 **Welcome remarks**
Dr. Debolina Kundu, Director (Additional Charge), NIUA

Context-setting and introduction
Dr. Mahreen Matto, Team Lead, NIUA

10:00-11:00 **Keynote address**
Dr. Ashok Khosla, Chairman, Development Alternatives
Mr. Nava Raj Pyakurel, Joint Secretary, Ministry of Urban Development, Nepal
Mr. Rinzin Dorji, Chief, Jigme Dorji National Park, Ministry of Energy and Natural Resources, Bhutan
Ms. Sakshi Gudwani, Senior Program Officer, Gates Foundation

Special address
Mr. Binay Kumar Jha (IRS), Director (SBM-III & PHE), MoHUA

Chief guest
Mr. Rajeev Kumar Mital (IAS), Director General, National Mission for Clean Ganga

Launch of knowledge products

11:00-11:30 **Gallery walk: Exhibition and posters**

11:30 -11:45 TEA BREAK

11:45-13:15 **Session 1: Water and climate: The growing concern in mountain settlements**

Moderator: Mr. Nitin Bassi, Senior Programme Lead, CEEW

Panellists: Mr. PD Rai, Former Member of Parliament, Sikkim; Dr. GN Qasba, Integrated Research and Action for Development (IRADe); Mr. Anup Karanth, World Bank; Dr. Rajesh Thadani, Center for Ecology Development and Research (CEDAR)

13:15-14:00 LUNCH BREAK

14:00-15:30 **Session 2: Integrated water resource management in hilly region**

Moderator: Mr. Rajiv Ranjan Mishra, Former IAS and Chief Advisor, NIUA

Presentation: Ms. Erica Udas, ICIMOD

Panellists: Ms. Laura Sustersic, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); Dr. Victor Shinde, NIUA; Dr. Jagdish Krishnaswamy, Indian Institute for Human Settlements (iihs); Mr. Mitra Baral, Water and Energy Commission, Nepal; Mr. Deepak Bezbaruah, Director- UDD, Government of Assam

Agenda

15:30-15:45 TEA BREAK

15:45-17:30 **Session 3: Enabling, developing and sustaining an environment for equitable sanitation services (liquid waste management)**

Moderator: Mr. G Mathi Vathanan (IAS), Director General, Gopabandhu Academy of Administration, Government of Odisha
Panellists: Mr. Dhruv Bhavsar, Center for Water and Sanitation - CEPT; Ms. Bhawana Sharma, Environment and Public Health Organisation (ENPHO), Nepal; Mr. Shantanu Padhi and Mr. Manpreet Singh, NIUA

17:30-17:45 **CLOSING REMARKS AND REFLECTIONS FROM THE DAY**

19:30 DINNER

DAY 2: UNDERSTANDING SOLID AND LIQUID WASTE MANAGEMENT FOR THE HILL CONTEXT

9:30-10:15 **REGISTRATION AND TEA**

10:15-10:45 **Voice from the hills:**
Ms. Pragya Pradhan, UN-Habitat, Nepal; Mr. Surender Chauhan, Mayor, Shimla

10:45-12:30 **Session 4: Strengthening municipal finance for sustainable service delivery in hilly regions**

Moderator: Dr. Debolina Kundu, Director (Additional Charge), NIUA
Panellists: Mr. Milind Mhaske, Praja Foundation; Mr. Tikender Singh, Former Deputy Mayor, Shimla; Mr. Kalanidhi Devakota, Municipal Association of Nepal (MuAN); Mr. Arvind Mehta, Former IAS; Mr. V. R. Raman, Centre for Budget and Governance Accountability (CBGA); Mr. Tenzin, Thimpu District Administration, Government of Bhutan; Ms. Shrestha Saraswat, Janaagraha

12:30-13:00 **Gallery walk: Exhibition and Posters**

13:00-13:45 LUNCH BREAK

13:45-15:30 **Session 5: Solid and legacy waste management in hilly regions with a climate lens**
Moderator: Mr. Rohit Kakkar, Deputy Advisor, CPHEEO
Case Study Presentation: Mr. Tshering Sherpa, Sagarmatha Pollution Control Committee (SPCC), Nepal; Mr. Stanzin Rabgais, Municipal Committee of Leh; Mr. Jigme Gembo, Department of Environment and Climate Change, Bhutan
Panellists: Mr. Atin Biswas, Centre for Science and Environment (CSE); Mr. Roshan Rai, Integrated Mountain Initiative (IMI); Paramita Dutta Dey, NIUA; Mr. Pradeep Sangwan, Healing Himalayas; Ms. Kiranmayee, BORDA-SA

Agenda

15:30-15:45 TEA BREAK

15:45-17:30 **Session 6: Decentralised liquid waste management technologies in the hill regions**

Moderator: Mr. Manas Rath, Senior Advisor, BORDA-South Asia

Case Study Presentation: Dr. A Kalimuthu, WASH Institute; Mr. Harsh Vardhan, CDD India; Ms. Chhavi Sharda, GIZ; Mr. Deepak Malik, Peyjal Nigam, Uttarakhand

Fireside Chat: Mr. Prasanta Mohapatra, CPHEEO; Prof. Mona Iyer, CEPT University

17:30-18:00 **CONCLUSION AND WAY FORWARD**

19:30 DINNER

About

Parvat-Manthan Forum

With the launch of “Parvat-Manthan: Manifestation of Clean and Sustainable Hill States” by the National Institute of Urban Affairs, the forum continues to work extensively to bring together the states of the Indian Himalayan Region (IHR) and other countries from the Hindu Kush Himalaya (HKH) Region, to achieve the UN Sustainable Development Goals especially goals 6, 11 and 13.

The forum aims to build a collaborative and responsive platform that provides hand-holding support and knowledge exchange among the hill towns and cities through active engagement with each other and the provincial and central governments to ensure settlements are inclusive, sustainable, and climate-resilient.

NIUA, in the past two years, has organised a series of consultation meetings with regional think tanks, government officials, elected representatives, and financial institutions to delve into the unique challenges and opportunities faced by the Himalayan Region, particularly in the areas of water and sanitation. The diverse and challenging terrain of the region highlights the necessity for a unified urban-rural vision for water, sanitation, and hygiene.

Past initiatives highlighted scattered settlements, inadequate infrastructure planning, limited accountability, and a lack of community awareness, focusing on asset creation over sustainable use. There is a pressing need for effective monitoring systems and adequate financial resource allocation.

To build on these insights and promote sustainable development in the mountain regions, the Parvat-Manthan forum was established. This platform leverages learnings from the Himalayas to foster a regional dialogue on creating clean and sustainable mountain settlements. The forum further aims to drive collaborative action and policy development for the region’s unique WASH challenges and opportunities.

Parvat-Manthan Regional Conclave December 2024

250+
Participants Attended

150+
Gallery Walk & Exhibition Footfall

5
International Development Organisations

19+
Government Bodies

28+
NGOs and CBOs

The Parvat-Manthan regional conclave aims to serve as a vital platform for addressing the urgent challenges faced by hill cities. This conclave focused on critical themes, including water and climate, sustainable municipal finance, integrated water resource management, equitable sanitation, decentralised waste management, and climate-sensitive waste strategies. These themes reflect the pressing realities of water, waste, and climate change, all of which significantly impact the delicate ecosystems of the Himalayan Region in India, Nepal, and Bhutan.

The conclave delved into key issues, such as the growing concerns around water scarcity and climate resilience, exploring how integrated water resource management can be tailored to the unique needs of Himalayan regions. Discussions on strengthening municipal finance reflected the challenges of allocation and fund utilisation by Himalayan states and thus aiming to enhance sustainable service delivery, ensuring that local governments can effectively address the diverse needs of their communities.

The conclave further focused on enabling equitable sanitation service delivery and implementing decentralised liquid waste management technologies, which are critical for promoting health and well-being in these often-remote and ecologically sensitive areas. The conclave also presented insights on solid and legacy waste management from a climate perspective, offering innovative solutions to cater to the needs of the sensitive Himalayan Region environment.

Additionally, the conclave introduced a technology-driven element by bringing together private sector participants to present their innovative technological solutions in the realms of water and waste management, emphasising climate-resilient designs.

The goal of the conclave was to facilitate knowledge exchange, advocate for sustainable policies, showcase technological innovations, and empower communities to safeguard the socio-ecological resilience of the Himalayas through Ideation for new research and capacity building streams. By elevating these critical conversations, the Parvat-Manthan Forum aimed to illuminate pathways toward an inclusive, sustainable, and climate-resilient future for Himalayan communities and beyond, ensuring the well-being of both present and future generations.

Keynote Address

Mr.Rajeev Mittal (IAS)
Director General, National Mission for Clean Ganga

Mr. Rajeev Mittal (IAS) stressed the interconnectedness of Himalayan ecosystems with river health, highlighting the Ganga basins' dependency on Himalayan glaciers. Furthermore, he emphasised the importance of adopting nature-based solutions (NbS) and context-specific approaches in fragile areas while adopting a comprehensive system-wide approach to water and waste management.

Mr. Binay Kumar Jha (IRS) highlighted challenges in mountain regions around transportation and collection inefficiencies as well as infrastructure limitations due to terrain constraints. Under SBM 2.0, for mountain regions, he suggested focusing on enhancing the efficiency of waste collection and transportation systems, supported by Nature-Based Solutions (NbS) for waste management, such as decentralised composting and small-scale anaerobic digesters as well as addressing floating populations that create additional pressure on waste management infrastructure in heavy tourist-influx regions.

Mr. Binay Kumar Jha
(IRS)- Director (SBM-III & PHE), MoHUA

Mr. Nava Raj Pyakurel
Joint Secretary, Ministry of Urban Development, Nepal

Mr. Nava Raj Pyakurel, highlighted the significant shift in Nepal's rapidly urbanisation trend leading to challenges in waste management and its treatment due to the increase in urban areas and municipalities. He proposed the need for investment in infrastructure development and capacity-building programs for municipalities while promoting transboundary cooperation to mitigate river pollution and cross-learning through shared governance models among Himalayan countries.

Mr. Rinzin Dorji highlighted Bhutan's diverse and rich forest and water resources managed under policies prioritising conservation, such as tree plantation and establishing buffers around water bodies. Bhutan faces challenges in managing waste due to accessibility issues as a result of scattered settlements and highland areas, exacerbated by seasonal activities. Further, he emphasised the need for policies ensuring all beneficiaries participate in Water User Associations with established bylaws and waste management protocols for governance through regional intervention and cooperation.

Mr. Rinzin Dorji
Jigme Dorji National Park, Ministry of Energy and Natural Resources, Bhutan

Dr. Ashok Khosla
Chairman, Development Alternatives

Dr. Ashok Khosla reflected on the ecological, spiritual, and economic importance of the Himalayas and the urgent need to preserve these regions amidst climate challenges through the adoption of circular economy principles for waste and resource management. Further, he insisted on conducting risk assessments to establish and enforce sustainability standards for infrastructure projects.

Ms. Sakshi Gudwani highlighted the urgency of addressing climate, environmental, and public health crises collaboratively through scalable, context-specific solutions involving private sector participation. Further to this, she advocated for deploying transformative technologies such as on-site circular waste solutions and looking for opportunities for sustainable financing, policy and frameworks for sanitation.

Ms. Sakshi Gudwani
Senior Program Officer, Gates Foundation

Dr. Debolina Kundu
Director (Additional Charge), NIUA

Dr. Debolina Kundu highlighted critical challenges in the Himalayan region due to topography, socio-economic vulnerability, unplanned urbanisation, inadequate water resource management, and solid waste management. In this context, the Parvat-Manthan Forum will actively anchor a participatory approach to address key challenges through a decentralised approach to sanitation solutions, sustainable municipal finance, and waste management innovations– in line with AMRUT, Swachh Bharat Mission, and other schemes and missions involving the rural-urban continuum.

Acknowledging the unique challenges faced by the Himalayan region due to their terrain, ecological fragility, and socio-economic disparities, Dr. Matto emphasised the need for collaborative platforms for stakeholders, including central and state governments, grassroots organisations, and donors, bottom-up approach and localised solutions tailored to address marginalisation and ensure equity in infrastructure and resource distribution.

Dr. Mahreen Matto
Team Lead, NIUA

Unveiling of Knowledge Products

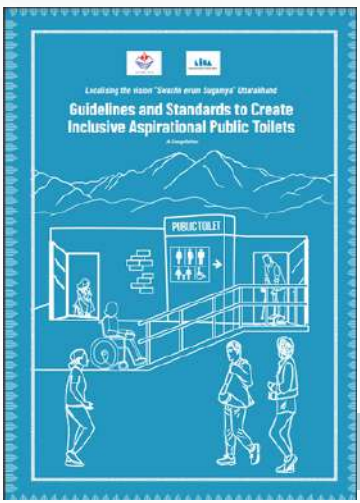
The following knowledge products were unveiled at the Regional Conclave:

1. Compendium on 'Untold stories from the Himalaya: 20 solutions for water and waste management'-

A unique collection of 20 successful water, sanitation, and waste management solutions from across the Himalayan Region in India, Nepal, and Bhutan. Developed by NIUA-SCBP in collaboration with International Center for Integrated Mountain Development (ICIMOD) under the ambit of Parvat Manthan hill forum, this document highlights on-ground innovations that have made a significant impact on local communities.

Click here to access

2. Guidelines & Standards to Create Inclusive Aspirational Public Toilets



A comprehensive guide to creating accessible and inclusive public toilets under the Swachh Bharat Mission, with a focus on Uttarakhand. This document was developed by the Sanitation Capacity Building Platform (SCBP) and the Inclusive Cities Centre (ICC) verticals at NIUA, and aims to improve sanitation infrastructure for all.

Click here to access

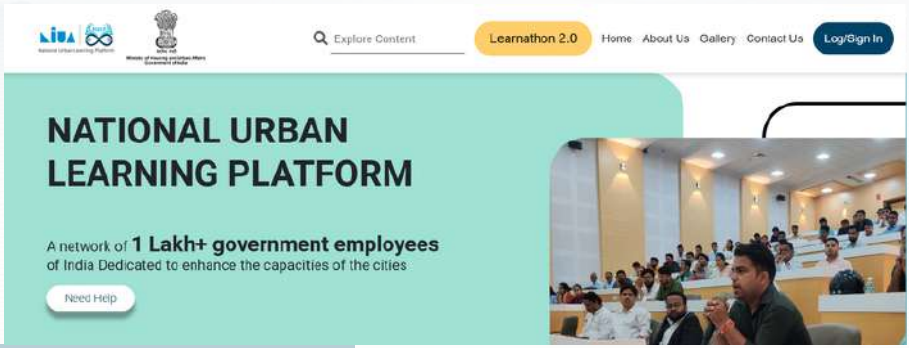
3. Desludging Fee Calculator Tool

A tool developed for Uttarakhand that standardise user charges for desludging services. It ensures fair pricing based on factors like haulage distance, terrain, and sludge volume, promoting transparency and supporting the implementation of municipal septage bye-laws.

Click here to access

4. Four Training Courses on Used Water and Septage Management

These courses cover Integrated Used Water Management and Septage Management (Design and Planning), and Faecal Sludge and Septage Management (Orientation and Co-Treatment). Available in English, Hindi and regional languages such as Bengali, Tamil and Nepali, they aim to build capacity for effective used water management across the country. The courses can be accessed on the NULP website.



Click here to access

Gallery Walk: Poster Presentation & Exhibition

With a special emphasis on youth engagement, the conclave provided an opportunity for stakeholders to engage with the themes of the conference through poster presentations. This initiative aims to document best practices, solutions (approach, technological, business model), and community based actions that celebrate initiatives undertaken within community structures and institutions in the Hill cities and towns that have the potential to be adopted at scale.

Over a span of two days, the Gallery Walk and Exhibition brought together a diverse group of participants from cities and towns across the Himalayan region and beyond, including- Government officials, policymakers, urban planners, engineers, researchers, academicians, think tanks, NGOs, and community organisations.

Additionally, the conclave introduced a technology-driven element by bringing together private-sector participants. These organisations were provided with an opportunity to present their innovative technological solutions in the realms of water and waste management, emphasising climate-resilient designs. Stall spaces were available for all the participants, facilitating direct interaction and collaboration with attendees.

9
Academic Institutions

15
Technology Exhibitors

20+
Research Posters Presented

20+
Private Organisations


AGRIFACTURE INDIA
PVT. LTD.


RECYCLING SYSTEM


OTT
OTT


Collaborative Action Towards
Inclusive Sanitation

Day 1

Vision for a Water-Wise Himalaya

The theme for the first day of the conclave involved delving into key issues such as the growing concerns around water scarcity and climate resilience, exploring how integrated water resource management can be tailored to the unique needs of hilly regions including liquid waste management in the Himalayan context.

Session 1

Water and Climate: The Growing Concern in Mountain Settlements

Session Objectives:

1. To initiate a spatial discussion on climate and water at the regional scale
2. Highlighting changes experienced in the past and future projections of extreme climate events in the Himalayan region
3. Discuss preparatory measures to address existing challenges, distinguishing between hills and plains

Key Insights:

- **Risk Assessment and Mitigation Strategies:** Insights focused on adopting a rigorous risk assessment and multi-hazard approach across parameters starting from population density, housing, and infrastructure to address system vulnerabilities and inform risk mitigation strategies. These parameters can support collating data around types of disasters, time durations and associated geo-climatic vulnerabilities, informing budgetary allocations to various mitigation projects in the Himalayan region.

- **Infrastructure Adaptation and Technology Convergence:** Further, discussions were centred around the adaptation of scientifically laid down infrastructure and technology in convergence with localised solutions that can promote resource management, aquifer and groundwater table recharge, aiding towards the development of a resilient ecosystem while safeguarding the population against the impacts of climate change and extreme weather conditions.

- **Community Engagement and Resource Monitoring:** Recommendations were provided on strengthening community and citizen forums along with parastatal bodies which can provide support in the collation of routine data and monitoring of the aquifers towards reviving springs and water bodies and identifying optimal recharge zones.

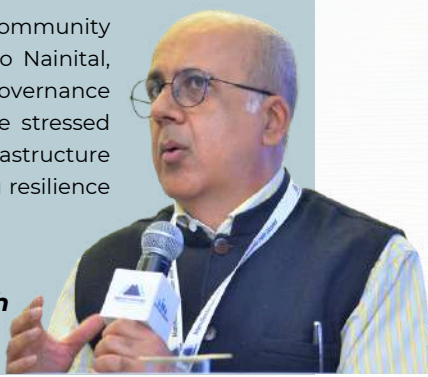
Mr. Bassi, as the moderator for this panel discussion, shared the broad context of challenges faced by the Himalayan region. He highlighted the growing concern on water shortages across the Himalayan region driven by climate change and rising tourism. He emphasised climate change issues, such as the glacial lake outburst and heat waves in the western Himalayas, to underscore the urgency in addressing these issues and avoiding long-term challenges.

Through moderating this panel discussion, he focused on the need for the adoption of sustainable governance mechanisms by state leadership, identifying the root cause for water shortage issues, with an emphasis on risk-preparedness and innovative technologies as tools to best solve the region-specific issues at hand.

Mr. Nitin Bassi,
Council on Energy, Environment and Water (CEEW)

Dr. Thadani shared insights on the Himalayan region's heavy reliance on monsoon-driven water resources, leading to significant seasonal fluctuations in availability, making dry months particularly challenging. He stressed the crucial role of aquifers in sustaining water supply, noting that they are often overlooked in discussions on water scarcity. To maintain these vital resources, effective recharge strategies must be implemented. Forest degradation poses a major threat to water recharge capacity, as healthy forests play a crucial role in maintaining aquifer levels. He highlighted that conservation efforts, therefore, need to consider the deep interconnection between ecosystems and water resources. He also distinguished that unlike aquifers in the plains, mountain aquifers are dynamic and more difficult to monitor due to their unique flow patterns. Their underground movement results in the emergence of springs where impermeable and permeable zones meet, complicating both measurement and management.

Dr. Thadani underscored the vital impact of community engagement in managing water resources, pointing to Nainital, where local involvement in data collection and water governance exemplifies successful community-led conservation. He stressed the necessity of rigorous risk assessments for water infrastructure in mountainous regions, which are crucial for bolstering resilience against unpredictable climate threats.



Dr. Rajesh Thadani,
Center for Ecology Development and Research (CEDAR)

Mr. Rai highlighted that the increasing water supply shortages in Gangtok exacerbated by climate change and rising tourism have led to a growing reliance on water supply through private sources such as tankers. Mr. Rai emphasised the urgency of addressing this issue to prevent long-term dependencies and inefficiencies in water distribution. The evolving political economy of water management poses additional risks if not proactively managed. Climate change is having a profound impact on the region, particularly affecting permafrost and glaciers, which are vital sources of water. Their gradual depletion raises concerns about the long-term sustainability of water resources.

Despite heavy rainfall leading to flooding, groundwater recharge and aquifer capture remain inadequate due to rapid surface runoff and unsustainable infrastructure that disrupts natural ecosystem balance. By learning from past climate extremes, infrastructure planning must prioritise sustainable water management strategies to mitigate future risks and enhance long-term resilience.

Mr. PD Rai,
Former Member of Parliament, Sikkim

Mr. Karanth focused on disaster preparedness to enhance the resilience of municipal water supply systems. He highlighted the importance of leveraging existing toolkits and frameworks to identify vulnerabilities and streamline emergency procurement processes, ensuring a quicker and more effective response while strengthening institutional capacities for risk mitigation and emergency management. He emphasised the critical need to understand the evolving risk landscape in the Himalayas for effective disaster management and highlighted that comprehensive assessments of hazards and vulnerabilities are essential to inform decision-making and mitigation strategies.

He also emphasised the critical need for collaboration across diverse institutions, advocating for the integration of data from various sectors to develop a comprehensive risk assessment platform. This approach enables local governments to harness informed decision-making capabilities essential for strategic development planning. By doing so, it significantly enhances urban resilience and ensures communities are better equipped to handle environmental uncertainties, ultimately leading to sustainable urban development.

Mr. Anup Karanth,
World Bank

Dr. Qasba shared learnings from the unprecedented flooding in Srinagar, highlighting the urgent need for stronger infrastructure and governance to manage extreme weather events. He brought up how the crisis demonstrated the crucial role of resilience and community engagement in disaster management. The floods caused extensive damage, severely impacting critical infrastructure such as hospitals and communication networks, exposing urban vulnerabilities to natural disasters. Conducting thorough vulnerability assessments is essential for future risk reduction.

During the floods in 2014, a multi-tiered governance model was implemented, involving collaboration between different levels of government and community leaders. This model proved effective and can serve as a blueprint for future disaster response strategies. The Srinagar floods underscored the broader need for resilience-building measures to address both floods and droughts, as communities in the region face diverse climatic threats. Developing comprehensive long-term strategies is essential for sustainable adaptation and risk mitigation.

Dr. GN Qasba,
Integrated Research and Action for Development (IRADe)

Session 2

Integrated Water Resource Management in Hilly Region

Session Objectives:

1. Discuss impacts of urban development and climate change on the groundwater and surface water flows and their availability for drinking and irrigation.
2. Highlighting capacity building and multi-stakeholder approach for Integrated Water Resource Management.
3. Presenting Innovative solutions and green finance mechanisms for ensuring water services and future water security

Key Insights:

- **Decentralised Infrastructure and Storm-Water Management:** Insights focused on implementing nimble infrastructure with climate financing and innovative technologies in mountain regions that balances the Himalayan ecosystem and ensures water security. Additionally, it was suggested that applying the Storm Water Management Model (SWMM) in high-rainfall areas is vital for flood simulation and effective decision-making, preventing siltation, blockages, and urban waterlogging.
- **River Basin Management Innovations:** Recommendations included utilising hydrological modeling to identify climate risks and climate-proof infrastructure while integrating biosolids in agriculture effectively addresses river management and river basin management cycle challenges.
- **Integrated Water and River Basin Management:** Further, it was highlighted that adopting tailored strategies for managing urbanisation impacts on Himalayan water resources is crucial. This included climate adaptation measures to tackle land use and unplanned population growth.
- **Enhancing Collaboration and Incentivisation:** Strong emphasis was placed on strengthening collaboration among public, social, and private sectors through clear pathways and coordination is key for addressing water management challenges, including disaster mitigation and irrigation.
- **Capacities for Innovation and Adaptation:** Insights revolved around leveraging collaboratives and knowledge platforms is essential for capacity building, promoting innovative and holistic approaches to urban and river planning.

While introducing the panel, **Mr. Mishra** highlighted key challenges pertaining to the Himalayan region and the need to explore strategies for improving water management through the lens of Integrated Water Resource Management (IWRM).

Mr. Mishra further emphasised the need for special attention and tailored interventions for hilly regions, highlighting how the general paradigm for water management often centres on approaches suited for plains, which are then upscaled to hilly terrains.

Mr. Rajiv Ranjan Mishra,
Former IAS and Chief Advisor,
National Institute of Urban Affairs

Dr. Krishnaswamy emphasised the interconnectedness of surface and groundwater systems, which are often treated as distinct entities in conventional water management approaches. Drawing from historical examples, he cited the Shimla water sanctuaries of the 1930s and community-driven efforts in Palampur, Himachal Pradesh, where locals were willing to pay for the preservation of Himalayan ecosystems. These cases often underscore the importance of holistic, integrated approaches that combine blue, green, and grey water systems. He advocated for innovative technologies and underscored the criticality of maintaining the biogeophysical balance of the sensitive Himalayan ecosystem.

Dr. Krishnaswamy also highlighted the role of climate finance in addressing water security challenges, proposing the identification of areas requiring nimble, decentralised infrastructure versus those needing heavily invested systems.

He also recommended smaller treatment plants for hilly regions to address their specific needs. He further reflected on the capacity-building needs of civil society organisations at the grassroots level towards research and development for the implementation of innovative approaches on nature-based solutions and the rejuvenation of water bodies while improving financing through green credits in the mountain context.

Dr. Jagdish Krishnaswamy,
Indian Institute for Human Settlements

Mr. Bezbaruah presented a detailed account of Assam's stormwater management challenges arising from high-intensity rainfall in the neighbouring hilly regions of Meghalaya and Arunachal Pradesh. He explained how stormwater loses velocity upon entering the plains, resulting in siltation, channel blockages, and urban waterlogging.

He highlighted the use of the Storm Water Management Model (SWMM) to simulate flood scenarios and guide informed decision-making. He also underlined the critical need for a comprehensive sewer network in Guwahati to prevent black and grey water from mixing with stormwater.

Noting that the state of Assam has only one operational sewage treatment plant, he called for urgent efforts to expand sewage management infrastructure while building the capacity of urban sanitation department teams towards data based planning.

Mr. Deepak Bezbaruah,
Urban Development Department,
Government of Assam

Ms. Sustersic emphasised that the narrative on climate change mitigation often centres on the transport sector, overshadowing the significant role of the water sector. She advocated for the inclusion of water-related discussions in high-profile international forums such as G-20 and COP meetings. Highlighting GIZ's work with the Namami Ganga Mission and the Brahmaputra Board, she explained how the River Basin Management (RBM) cycle integrates climate change scenarios through hydrological modelling to identify climate risk hotspots. She stressed the importance of climate-proofing infrastructure, capacity building, and public outreach in addressing these challenges.

Ms. Sustersic also shared GIZ's work in Uttarakhand, where usage of biosolids are being mainstreamed into agriculture as part of district-level Ganga plans. Advocating for decentralised and smaller-scale infrastructure in hilly regions, she concluded by highlighting the need for targeted interventions informed by RBM cycles.

Ms. Laura Sustersic,
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Mr. Baral emphasised shared responsibility as the cornerstone of effective water resource management. citing Nepal's 2015 Constitution, he highlighted provisions mandating the safeguarding and efficient use of natural resources.

He argued that trust-building through initial government investments could attract private sector participation. He further emphasised the idea of incentivising private sector involvement through clear profit pathways and intergovernmental coordination across administrative tiers.

He also stressed the role of public social groups in addressing specific facets of water management, such as disaster mitigation and irrigation, through building capacity for research and development to prepare disaster risk mitigation strategies. These efforts, he explained, would collectively contribute to a successful integrated river basin management.

Mr. Mitra Baral,
Water and Energy Commission, Nepal

Dr. Shinde commenced his presentation with a captivating historical anecdote, illustrating how water resources shaped the development of civilisation in what is now known as Mexico's Beverly Hills during the 1800s. He referenced the 2018 NITI Aayog report, which highlighted a critical depletion of Himalayan springs, underscoring the urgency for collaborative action among diverse stakeholders.

Dr. Shinde passionately advocated for comprehensive urban planning, detailing how NIUA's Urban River Management Plan effectively integrates various interconnected environmental, social, and economic factors to ensure sustainable urban water management. Expanding on practical applications of these strategies, Dr. Shinde illustrated this approach with the example of Aizawl, which benefited from technical support through its partnership with Bhubaneswar under the River City Alliance.

This alliance is a robust knowledge-sharing network involving 145 cities across 21 states, designed to facilitate cooperative solutions and foster urban resilience. He emphasised that the success of such initiatives hinges critically on robust capacity building and proactive stakeholder engagement, positioning these elements as essential pillars for the sustainability of water management efforts.

Dr. Victor Shinde,
National Institute of Urban Affairs

Ms. Udas, through her presentation, highlighted the need for an integrated water resource management approach across the Hindu Kush Himalaya (HKH) region. She further deep dived into existing impacts of climate and environmental changes on water resources while presenting insights from a comprehensive new study of the Hindu Kush Himalaya (HKH) region, citing that the current emissions would lead to five degrees in warming and a loss of two-thirds of the region's glaciers by 2100. Her presentation highlighted the heightened risks due to the inaccessibility, fragility, and remoteness of the HKH region, emphasising its extreme vulnerability

Ms. Udas outlined the importance of integrated water and river basin management to maintain ecological balance and support local livelihoods. She advocated for stronger collaborative efforts and enhanced global recognition of mountainous areas, particularly the HKH region, in terms of global climate strategies. This focus is crucial for developing effective, localised responses to climate challenges and strengthening resilience through international partnerships.

Ms. Erica Udas,
International Centre for Integrated Mountain Development (ICIMOD)

Session 3

Enabling, Developing & Sustaining an Environment for Equitable Sanitation Services

Session Objectives:

1. Highlighting the differences between plains and hill contexts for safe sanitation service delivery.
2. Policies, programmes and schemes, regulations and legislation for effective sanitation delivery.
3. Data-driven and community-centric approaches with climate-adaptive measures for effective sanitation service delivery in hill contexts.

Key Insights:

- **Multidisciplinary Approach to Safe and Inclusive Sanitation:** Panelists highlighted integration of health, water supply, and sanitation as a crucial aspect. Further, focusing on waste containment and treatment was recommended for sustainable operations and maintenance of public convenience, ultimately enhancing community health and well-being.
- **Documenting Indigenous and Community-Led Best Practices:** Especially in regions challenged by geography (remote) and tourism influx, documenting indigenous and community-driven sanitation practices was highlighted. Identifying best practices that suit the local climate, land, and waste patterns as critical for developing scalable, culturally appropriate solutions was further emphasised.
- **Community Engagement and Inter-departmental Convergence:** Robust community engagement and governmental cooperation being key for effective sanitation management in hilly areas was emphasised upon. Developing decentralised models and promoting governmental coordination to build a comprehensive sanitation framework, strengthening interventions across the sanitation value chain was recommended.
- **Developing Contextualised Decentralised Liquid Waste Management:** Insights also included tailoring guidelines for decentralised liquid waste management in hilly regions and aligning them with national missions like AMRUT and SBM. Using digitised data platforms was recommended to optimise funding ensuring investments leading to sustainable waste management solutions that fit local conditions.

Mr. Mathi Vathanan highlighted key achievements since the inception of the Swachh Bharat Mission in India, with more than 6 lakh toilets having been constructed and India's declaration to be open defecation-free. He highlighted that as cities grow and population densities increase, the management of faecal sludge and septage becomes critical to sustaining public health and environmental integrity. Despite significant strides in toilet construction, the infrastructure for Faecal Sludge and Septage Management (FSSM) remains inadequate, threatening the long-term sustainability of sanitation gains. He highlighted that only 40% of urban India is connected to sewer networks, leaving 60% of urban households reliant on On-Site Sanitation Systems (OSS), such as septic tanks and pit latrines, for faecal waste management. OSS, while essential for basic sanitation access, offer significant potential for improvement through regular maintenance and upgrades to ensure optimal performance, thereby preventing overflows, groundwater contamination, and improper disposal of untreated waste. He introduced how FSSM is being adopted by states in India such as Odisha, Telangana, and Maharashtra.

He introduced the expert panel to deep dive into the topic to understand safe sanitation systems in the context of hilly areas and the need and feasibility to adopt FSSM. Building on his experience from Odisha, he also emphasised on the role of community in service delivery across sanitation value chain and capacity building of stakeholders.

Mr. G Mathi Vathanan (IAS),
Director General, Gopabandhu Academy of Administration, Government of Odisha

Mr. Bhavasar began by defining safe sanitation, highlighting it as a cross-sectoral and multidisciplinary approach. He further deep-dived into building a correlation between toilets and water supply systems and their interlinkages with health. He reaffirmed that safe sanitation is beyond toilet construction and needs to be addressed throughout the sanitation value chain.

He highlighted challenges in treatment infrastructure, including land constraints, accessibility and transportation, particularly in the hilly context, which requires an integrated approach to solid and liquid waste management. Citing examples from hilly towns in Maharashtra, he emphasised community partnership models and building their capacities to provide service delivery. Given that resources are often scarce in Himalayan regions, he emphasised the benefits of integrated waste management facilities and private partnerships.

Mr. Dhruv Bhavsar,
Center for Water and Sanitation (CWAS)
CEPT University

Ms. Sharma highlighted the issues associated with waste generation in Nepal and the Himalayan region due to seasonal migration and tourist influx. She further highlighted the lack of availability of service providers and high costs associated due to scarcity of resources.

She further highlighted the lack of clear institutional or regulatory frameworks amongst schemes, policies and initiatives from government departments. She also emphasised the need for engaging community groups across local municipalities for advocacy on WASH initiatives as well as for service delivery. She concluded that there is a need to incentivise private sector players for the provision of sanitation services across the value chain.

Ms. Bhawana Sharma,
ENPHO, Nepal

Mr. Padhi shared the as-is status of sanitation infrastructure in hilly regions, highlighting the rudimentary approach to constructing septic tanks, which is often not connected to a soak pit, percolating into groundwater, resulting in contamination of the water table.

He further highlighted the limitations in connectivity of the soak pits with a dedicated containment system leading to the disposal of untreated waste directly into water bodies, causing pollution.

He shared the need for convergences across policies and initiatives, such as AMRUT and SBM for Himalayan states in India, to leverage funds and curate guidelines for efficient liquid waste management while engaging the community for operationalising decentralised sanitation systems.

Mr. Shantanu Padhi,
National Institute of Urban Affairs

Mr. Singh emphasised the importance of digital platforms. Highlighting the Urban Platform for delivery of Online Governance (UPYOG), created under India's National Urban Digital Mission, he shared how such approaches and programs can assist municipal bodies to improve service delivery mechanisms, achieve better information management and transparency and ensure utmost citizen's involvement in participative governance. He further highlighted the need for establishing and leveraging digital platforms to promote cross-learning among peer-to-peer networks especially among similar geographies.

Mr. Manpreet Singh,
National Institute of Urban Affairs

Day 2

Understanding Solid & Liquid Waste Management for the Hill Context

Day 2 explored critical levers for strengthening service delivery in hill cities, focusing on municipal finance, solid and legacy waste management, and decentralised liquid waste management. Discussions highlighted the need for fiscal autonomy, climate-resilient waste solutions, and innovative decentralised systems tailored to mountainous terrains. Experts shared insights on governance, sustainable financing, and emerging technologies, offering actionable strategies for long-term resilience. The interactive exhibition further showcased pioneering WASH solutions and climate-adaptive practices. The day reinforced the importance of collaboration, policy innovation, and adaptive urban planning in ensuring sustainable service delivery for hill cities.

Voice from the Hills

Elevating Mountain Voices to Global Discourses

Ms. Pragya Pradhan, an urban resilience expert with UN-Habitat Nepal, stressed the importance of integrating Himalayan community voices into global urbanisation discussions at the World Urban Forum in Cairo. She advocated for localising sustainable urban planning to address mountain-specific challenges within global policies.

Ms. Pradhan discussed Nepal's urbanisation shift from hill districts to plains, driving the need for innovative governance and financial strategies. A notable development was Nepal's transition from administrative to functional urban area classifications, a model that could benefit other Himalayan regions. She outlined five critical actions: strengthening local governance, boosting climate financing for mountainous areas, utilising localised data for better decision-making, and advocating for global recognition of mountain issues, similar to the approach of Small Island Developing States (SIDS). Her closing was a call to unify and elevate mountain-specific policies on global platforms.

Ms. Pragya Pradhan,
UN-Habitat, Nepal

Local Leadership in the Heart of the Himalayas

Mayor Surender Chauhan of Shimla offered a personal insight into urban governance challenges in hill cities. He described Shimla as North India's lungs, emphasising the environmental stewardship necessary in Himalayan cities due to their ecological roles and climate vulnerabilities.

Mr. Chauhan advocated for financial parity between urban and rural areas, noting the struggles of urban local bodies in hill regions with inflexible financial systems hinder addressing key needs like sanitation, drainage, and disaster resilience. He underscored the urgency for policy reform by pointing out the severe impact of recent climate-related disasters in Himachal Pradesh. Calling for a unified approach for Himalayan cities, he urged policymakers to recognise the unique needs of hilly urban areas, arguing that standard urban policies fail in mountainous settings. He emphasised the importance of tailored governance, infrastructure, and financial models to ensure the preservation and sustainable development of Himalayan cities.

Mr. Surender Chauhan,
Mayor, Shimla

Session 4

Strengthening Municipal Finance for Sustainable Service Delivery in Hilly Regions

Session Objectives:

1. Examine the financial challenges unique to hilly municipalities, including fiscal constraints, infrastructure costs, and governance capacity gaps
2. Explore innovative revenue-generation mechanisms and taxation strategies tailored for mountain regions to ensure financial sustainability
3. Highlight the importance of equitable fiscal devolution and capacity building for local governments to improve service delivery and economic resilience

Key Insights:

- **Localised Financial Empowerment:** The session underscored the critical role of local governments in hilly regions to develop financial policies and taxation mechanisms that are specially tailored to their unique geographic and socio-economic contexts. This strategic adaptation promotes empowered and responsive local governance, significantly enhancing the ability of local bodies to manage resources effectively and tackle local challenges proactively.
- **Strategic Revenue Enhancement:** Insightful discussions at the session illuminated a variety of innovative revenue generation strategies particularly well-suited for hilly areas, such as imposing environmental levies or instituting tourist taxes. These strategies are designed to strengthen local finances and provide means to manage environmental and infrastructural pressures sustainably.
- **Capacity Building for Financial Autonomy:** Enhancing the financial literacy and administrative capabilities of local governmental bodies was seen as essential for achieving fiscal autonomy. This capacity building involves comprehensive training programs, technological enhancements, and robust legislative and policy support, all aimed at empowering effective fiscal management and enhancing revenue mobilisation at the grassroots level.
- **Equitable Intergovernmental Transfers:** There was a strong consensus on the need to reform intergovernmental transfer mechanisms to ensure fairness and responsiveness. The aim is to make these transfers equitable, reflective of the specific needs of hilly regions, and supportive of targeted urban development efforts.

Dr. Kundu initiated the discussion by elucidating the critical challenges inherent to securing sustainable municipal finance in hilly regions, characterised by limited fiscal resources, high costs of infrastructure development, and a pressing need for capacity enhancement in local governance.

She emphasised the pivotal role of empowered local governments in effectively leveraging taxation and improving service delivery, crucial for addressing the unique socio-economic and environmental challenges faced by hilly municipalities.

Dr. Debolina Kundu,
Director (Additional Charge),
National Institute of Urban Affairs

As a veteran member of the Finance Commission of India, **Mr. Mehta** provided a nuanced discussion on fiscal devolution and the strategic allocation of taxes to states and municipalities. He advocated for a gradualist fiscal approach that avoids abrupt tax increases, which can lead to significant public pushback.

He recommended incremental adjustments to taxation, guided by well-structured financial benchmarks aimed at progressively achieving optimal GDP contributions from urban areas, thereby fostering a robust, self-sustaining municipal financial ecosystem.

Mr. Arvind Mehta,
Former IAS

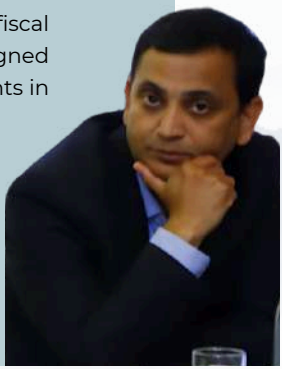
Mr. Singh brought to the fore the nuanced interplay between tourism and municipal finance in hilly regions. He critically analysed how tourism could act both as a financial boon and a developmental challenge, straining local infrastructures and resources.

Advocating for a paradigm shift, he called for financial frameworks that consider the ecological and social intricacies of mountain towns, promoting sustainable tourism that supports rather than exploits local development.

Mr. Tikender Singh,
Former Deputy Mayor, Shimla

Representing the municipal perspective from Nepal, **Mr. Deokota** delved into the implications of Nepal's recent federal restructuring on local fiscal dynamics. He detailed the establishment of fiscal commissions designed to recommend and allocate budgets, thereby aiding local governments in planning and implementing essential services.

His insights highlighted the ongoing challenges and disparities in resource distribution among urbanising locales, underscoring the critical need for equitable financial strategies in the face of rapid urbanisation.



Mr. Kalanidhi Devakota,
Municipal Association of Nepal

From the perspective of Bhutan, **Mr. Tenzin** shared how Bhutan is addressing the urbanisation challenge, particularly the migration from rural areas to urban centers seeking better job opportunities and services. He outlined Bhutan's strategic approaches to managing these migrations through targeted fund allocation for municipal services, which are crucial in maintaining sustainable urban growth and service delivery within the unique context of a predominantly rural country.

Mr. Tenzin,
Thimpu District Administration,
Government of Bhutan

Ms. Shreshtha offered a deep dive into her extensive work on assessing municipal accounts across India, which revealed significant insights into the financial operations of urban local bodies. Her analysis pointed to a disproportionate reliance on central and state grants, with a stark underutilisation of potential own-source revenues.

She advocated for a more differentiated and strategic approach to financial management in cities, especially those in hilly regions, to enhance fiscal self-reliance and reduce dependency on unpredictable grant flows.

Ms. Shrestha Saraswat,
Janaagraha

Mr. Raman addressed the complex issue of vertical fiscal imbalances and the uniformity of financial devolution across diverse states. He highlighted the urgent need to reconsider the financial governance structures that currently lead to inefficient allocations and do not adequately address local climate concerns.

His recommendations included redefining the financial responsibilities of national and provincial governments to better support local bodies in their quest for sustainable development.

Mr. V. R. Raman,
Centre for Budget and Governance Accountability

Mr. Mhaske discussed the integration of good governance practices with sound urban financial management, drawing on his experiences with the Praja Foundation. He stressed the importance of innovation in revenue generation and governance practices, which could significantly empower cities to manage their resources more effectively.

By citing examples like Mumbai's innovative financial mechanisms, he illustrated how urban local bodies could creatively enhance their financial base beyond traditional models.

Mr. Milind Mhaske,
Praja Foundation

Session 5

Solid and Legacy Waste Management in Hilly Regions with a Climate Lens

Session Objectives:

1. Examine the unique challenges of solid and legacy waste management in hilly regions, including tourism pressure, geographical constraints, and climate adaptation needs.
2. Explore innovative, region-specific waste management models from India, Nepal, and Bhutan to identify scalable and replicable solutions.
3. Highlight the role of community participation, regulatory frameworks, and technological innovations in advancing sustainable waste management.

Key Insights:

- **Adaptive Waste Management Frameworks:** Insights pointed at waste management solutions tailored to the unique geography and socio-economic conditions of hilly regions, including the impacts of tourism. Locally adapted strategies that integrate cultural practices and innovative logistics are essential for sustainability and efficiency.
- **Economic and Regulatory Adjustments:** Discussions surrounded the heightened cost of waste management in mountainous areas due to transportation and infrastructure challenges. Region-specific financial models, subsidies, and policy adjustments are necessary to ensure equitable resource distribution and facilitate long-term sustainable solutions.
- **Decentralised Waste Management Solutions:** Emphasis was placed upon decentralised systems reducing reliance on centralised infrastructure, enhancing community engagement, and enabling local waste processing. Implementing small-scale treatment, local recycling hubs, and tailored waste segregation models supports a circular economy and increases efficiency.
- **Community Engagement and Behavioral Change:** It was highlighted that successful waste management requires active community participation. Initiatives such as awareness campaigns, participatory decision-making, and incentives for sustainable practices are crucial for fostering responsible disposal habits and ensuring solutions resonate with local needs.
- **Technological Innovations and Infrastructure Development:** Investing in region-specific technologies like solar-powered waste processing and improved logistics was recommended as it can significantly enhance waste management. Infrastructure development should accommodate terrain-specific challenges and leverage data-driven solutions for effective waste tracking and repurposing.

Mr. Rabgais detailed Leh's advancements in legacy waste management, spotlighting the establishment of India's first solarised solid waste management plant in such a challenging environment. He described how the plant operates using solar energy, adapting to the significant seasonal variations in waste generation typical of Leh.

Additionally, he highlighted recent initiatives in bio-remediation that have transformed a once-neglected dumpsite into a model of modern, sustainable waste management, setting a benchmark for similar environments.

Mr. Stanzin Rabgais,
Municipal Committee of Leh, India

Mr. Sherpa presented the challenges and solutions implemented in managing solid waste in the Mount Everest region. He discussed the direct correlation between tourism and waste production, highlighting innovative strategies like the carry-back project, which involved tourists in waste reduction efforts. His presentation covered the logistical challenges of transporting waste out of remote areas and innovative uses of waste for creating souvenirs and road paving materials.

Mr. Tshering Sherpa,
Sagarmatha Pollution Control Committee, Nepal

Mr. Gembo discussed Bhutan's strategy to achieve zero waste by 2030 through its robust legal framework and strategic goals. He highlighted the critical role of community engagement in driving sustainable waste management practices and the educational efforts to promote environmental responsibility.

Mr. Gembo also addressed challenges such as the need for better infrastructure and behavioral changes to support these initiatives, underscoring the integrated approach required to meet Bhutan's ambitious environmental targets.

Mr. Jigme Gembo,
Department of Environment and Climate Change, Bhutan

Mr. Kakkar highlighted the critical challenges and innovative solutions in waste management for mountainous regions. He stressed the importance of climate-resilient strategies and the need for infrastructure tailored to the unique demands of hilly terrains, particularly under the increasing pressures of tourism. Through discussions on case studies from India, Nepal, and Bhutan, he underscored the value of community-led initiatives and cross-regional collaboration. Kakkar's insights emphasised actionable strategies for sustainability, advocating for the replication of successful practices to enhance environmental stewardship in similar contexts globally.

Mr. Rohit Kakkar,
Deputy Advisor, Central Public Health and Environmental Engineering Organisation

Mr. Biswas highlighted the absence of regulatory frameworks specifically crafted for the waste management complexities in hilly terrains. He illuminated the economic disparities in waste collection and transportation costs, which were significantly higher in hilly areas compared to plains due to logistical challenges posed by rugged landscapes. Advocating for a paradigm shift, he called for a decentralised waste management approach that was intimately woven with local community practices, ensuring sustainability and local employment enhancement.

Mr. Atin Biswas,
Centre for Science and Environment

Mr. Rai provided insights from extensive cleanup campaigns across the Himalayas, exposing a distressing volume of non-recyclable waste. He criticised the myopic focus on end-of-life waste management and championed a comprehensive approach that addressed the entire lifecycle of products.

His discourse underscored the necessity for transformative changes in production and consumption paradigms, particularly concerning plastics, to foster a true circular economy.

Mr. Roshan Rai,
Integrated Mountain Initiative (IMI)

Ms. Dutta Dey explained how the principles of a circular economy could be effectively woven into waste management strategies for hilly regions. She stressed the critical importance of minimising waste generation at its source and extending product lifespans through innovative reuse and refurbishment practices.

Further, she underscored the need for strict enforcement of these strategies to ensure that theoretical plans are translated into tangible, effective actions that yield sustainable results.

Paramita Dutta Dey,
National Institute of Urban Affairs

Ms. Kiranmayee tackled the issue of legacy waste remediation in hilly regions, focusing on the prohibitive costs and logistical challenges inherent in these efforts. She advocated for the creation of region-specific cost benchmarks and the development of tailored standard operating procedures that align with the distinct environmental and logistical conditions of hilly areas. Her discussion underscored the pressing need for innovative cluster-based remediation models, emphasising that such pioneering approaches are crucial yet still to be implemented.

Ms. Kiranmayee,
Bremen Overseas Research and Development Association South Asia (BORDA-SA)

Mr. Sangwan recounted his efforts in mobilising community participation to tackle waste management challenges in mountainous areas. He described successful strategies that revolved around sustained community engagement and education aimed at altering local perceptions and habits towards sustainability.

He celebrated the transformative impact of community-driven initiatives, which cultivated a profound commitment to environmental stewardship among local populations.

Mr. Pradeep Sangwan,
Healing Himalayas

Session 6

Decentralised Liquid Waste Management Technologies in the Hill Regions

Session Objectives:

1. Exploring adaptive, decentralised liquid waste management solutions tailored to hilly terrains.
2. Showcasing innovative, community-driven and nature-based approaches for sustainable sanitation.
3. Strengthening governance, data-driven decision-making, and infrastructure innovations for resilient used water management.

Key Insights:

- **Decentralised, Adaptive Waste Management:** It was highlighted that traditional sewer systems are often impractical in hilly areas due to steep terrain and limited land. Decentralised solutions like on-site septage processing, eco-friendly toilets, and small-scale sewage treatment plants (STPs) are vital for addressing these challenges.
- **Community-Led and Nature-Based Solutions:** Engaging local communities in used water management was recommended as it enhances ownership and sustainability. Initiatives such as Munnar's riverfront developments and Leh's tourism-linked sanitation funding highlight the benefits of integrating environmental solutions with urban and economic planning.
- **Data-Driven Decision-Making for Effective Planning:** Soil and Water Assessment Tool (SWAT) modeling in the Ram Ganga River Basin Management Plan showed how thorough data collection can identify pollution sources, enabling targeted interventions and efficient resource use.
- **Infrastructure Innovations for Hilly Terrains:** The multi-story STP in Rishikesh demonstrated how vertical treatment facilities can optimise land use in dense hill towns. Mobile septage treatment units also provide flexible, cost-effective options for remote areas.
- **Strengthening Governance and Policy Frameworks:** Insights strongly highlighted that effective used water management in hilly areas requires strong policies, inter-agency cooperation, and specific financing mechanisms. Developing tailored regulations, simplifying planning approvals, and maintaining stakeholder engagement are crucial for long-term resilience.

Mr. Manas Rath effectively guided a session on advanced waste management strategies in the Himalayan region. He focused on the critical role of circularity and reuse in used water management, tailored for mountainous challenges. Mr. Rath highlighted decentralised systems as key to providing equitable sanitation services, emphasising innovative technologies and financing models that enhance sustainability.

His insights encouraged leveraging adaptive strategies to strengthen infrastructure resilience and integrate climate considerations, ensuring effective and sustainable waste management solutions in challenging terrains.

Mr. Manas Rath,
Bremen Overseas Research and Development Association South Asia (BORDA-SA)

Mr. Vardhan highlighted the waste management challenges in Darjeeling and Shimla, where steep slopes and inaccessible septic tanks make desludging hazardous. He emphasised the seasonal pressures of tourism and how regions like Leh use tourism revenue for sanitation, though extreme winters pose constraints.

He showcased Munnar's integrated riverfront projects, where waste management aligns with urban beautification and community spaces, reinforcing the need for holistic, decentralised solutions.

Harsh Vardhan,
CDD India

Dr. Kalimuthu addressed water contamination risks from untreated used water and poorly managed septic tanks in rain-prone, landslide-vulnerable hill towns. He advocated for tailored sanitation solutions like eco-san toilets in water-scarce regions and twin-pit systems in suitable soils.

Highlighting mobile septage treatment units, he stressed on-site waste processing as a scalable, cost-effective alternative to extensive infrastructure.

Dr. A Kalimuthu,
WASH Institute

Ms. Sharda provided an in-depth overview of the Ram Ganga River Basin Management Plan, which employs SWAT (Soil and Water Assessment Tool) modeling and comprehensive data analytics to accurately pinpoint pollution hotspots across the basin. She emphasised the significance of collaborative governance in driving the success of sustainable used water management interventions. This plan goes beyond mere identification and remediation of pollution sources by integrating nature-based sanitation solutions that mimic natural processes to treat used water effectively.

It also focuses on strengthening monitoring systems to ensure ongoing compliance and effectiveness while promoting policies aimed at the long-term protection of water resources. By offering a scalable model tailored for the unique environmental conditions of hilly regions, the plan demonstrates a proactive approach to water resource management that can be adapted and replicated in similar geographic settings.

Ms. Chhavi Sharda,
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

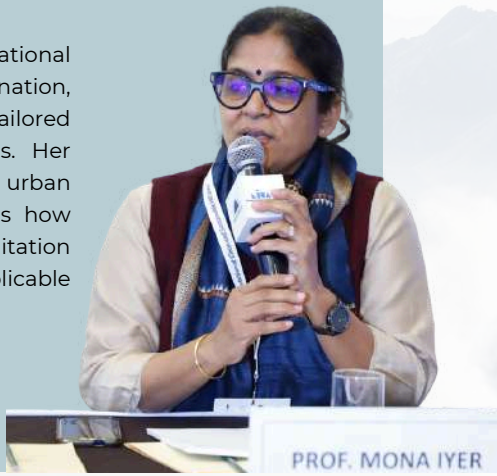
Mr. Malik delved deeply into Uttarakhand's cutting-edge sewage treatment approaches, particularly addressing the challenges posed by limited land availability. He spotlighted the state's groundbreaking initiative - India's first multi-story sewage treatment plant located in Rishikesh. This innovative facility stands as a testament to architectural and engineering advancement, specifically designed to optimise space in dense urban environments. By vertically integrating the sewage treatment process, the plant effectively conserves land while maintaining high efficiency in waste processing.

This project not only showcases Uttarakhand's commitment to innovative solutions in environmental management but also serves as a pioneering model for other regions grappling with similar spatial constraints. He outlined a hybrid used water management strategy: utilising centralised sewer systems in densely populated areas and decentralised faecal sludge management in less dense regions. This approach optimises resource use and improves waste management effectiveness across diverse landscapes. His insights reinforced the importance of climate-resilient infrastructure to withstand natural disasters.

Mr. Deepak Malik,
Peyjal Nigam, Uttarakhand

Dr. Mona Iyer addressed the significant disconnect between academic theories and the practical challenges of sanitation in real-world settings. She advocated for creating a comprehensive repository of case studies and real-life decision-making scenarios that could serve as a vital resource for urban planners and policymakers.

Dr. Iyer emphasised the crucial role of local educational institutions in leading knowledge dissemination, ensuring that sanitation solutions are effectively tailored to the specific needs of mountainous regions. Her pioneering work in integrating water-sensitive urban planning in cities prone to flooding exemplifies how climate resilience can be woven into broader sanitation and urban planning frameworks, providing a replicable model for other regions facing similar challenges.



Dr. Mona Iyer,
CEPT University

Mr. Prashant Mohapatra, reflecting on his pivotal role in transforming sanitation infrastructure in Odisha, highlighted the critical need for region-specific sanitation norms that consider the unique topographical, climatic, and financial challenges of hilly areas. He pointed out that the significant shortage of skilled consultants and contractors in these regions is major obstacle, advocating for enhanced government-supported training programs and initiatives that promote cross-learning among professionals.

Mr. Mohapatra stressed that policies should facilitate rather than obstruct innovation, with a streamlined approval process for new sanitation technologies to accelerate progress towards the SDGs by 2030. His insights underline the importance of adaptive policies that support technological advancements and capacity building in sanitation.

Mr. Prashant Mohapatra,
Central Public Health & Environmental Engineering Organisation

Conclusion

Key Actionables

This Regional Conclave, enriched by two days of profound discussions, expert presentations, and dynamic exhibits, has distilled essential strategic insights. These pivotal takeaways forge a robust foundation for forthcoming initiatives aimed at fostering sustainable development in the Himalayan hill cities.

01 *Evidence Building for Holistic Sanitation Service Delivery in the Himalayan Context*

Documenting and amplifying localised solutions to create a repository of best practices representing champion stories and voices from the Himalayan region.

Identify pilot areas across Himalayan regions and leverage used cases and case studies to generate SOPs and robust policy frameworks suited to regional contexts.

Advocate for comprehensive urban governance systems that integrate planning, finance, and service delivery in the Himalayan context through the Development of Guidelines, SOPs, and Frameworks.

Improve the collection of hyperlocal data through robust monitoring systems to inform decision-making processes.

02 *Policy and Institutional Strengthening*

Recommendations to CPHEEO and MoHUA regarding curation of working groups with experts, local partners and researchers to integrate Himalayan lens across development of all policy frameworks and guidelines.

Recommendations to the 16th Finance Commission to integrate disaster risk reduction, address regional complexities, and enhance ULBs' financial capacity, revenue generation, and resource management.

Strengthening state finance commissions through active engagement with state departments and advisory on municipal planning and budgeting processes in the Himalayan context.

03 *Capacity Building and Knowledge Exchange through the Parvat-Manthan Forum*

Enhance the capacity of municipal officials, urban planners, and community leaders through targeted training programs and exposure visits.

Facilitate knowledge-sharing forums and workshops to promote learning and demonstrate contextualised models and innovations from the Himalayan region.

PARVAT-MANTHAN

Manifestation of Clean and Sustainable Hill States

Regional Conclave

In Partnership with

BORDA

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