Proceedings of the Roundtable Discussion

From Data to Decisions: Leveraging AI for Evidence-Based Water Management

World Environment Day, 5 June 2026

Council on Energy, Environment and Water (CEEW), New Delhi

NatureDots

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1. Background and Context

The Council on Energy, Environment and Water (CEEW), in collaboration with NatureDots Private Limited, organised a multi-stakeholder roundtable discussion titled “From Data to Decisions: Leveraging AI for Evidence-Based Water Management” on the occasion of World Environment Day 2026. The roundtable was organised as part of the Glocal Evaluation Week 2026 and brought together experts from academia, think tanks, development organisations, technology companies, civil society institutions, and the private sector.

The discussion was convened against the backdrop of growing interest in Artificial Intelligence (AI), Digital Twins, and predictive systems for improving water governance. Participants recognised that while India has made progress in estimating water availability, substantial gaps remain in water quality monitoring and surveillance for water bodies. Existing monitoring systems continue to rely heavily on periodic sampling and fragmented datasets, limiting the availability of continuous and actionable information for evidence-based decision-making.

Participants repeatedly highlighted that the deployment of AI should not be viewed only as a technological advancement, but also through the broader lenses of governance, institutional coordination, affordability, community participation, trust, and long-term sustainability.

2. Objectives of the Roundtable

- To discuss the role of AI, Digital Twins, and predictive systems in water-quality monitoring and river management.
- To deliberate on implementation challenges associated with AI-enabled water governance systems.
- To explore opportunities for strengthening participatory and evidence-based water governance.
- To identify pathways for improving data accessibility, transparency, and institutional coordination.

3. Theme 1: From Innovation to Implementation

The first thematic session focused on the practical applications and implementation challenges associated with AI-enabled monitoring systems, Digital Twins, and virtual sensors for river and water-resource management.

3.1 AI and Digital Twins can transform river management from reactive responses to predictive and proactive decision-making

A major insight emerging from the discussion was that AI-enabled systems and Digital Twins have the potential to shift water governance from reactive crisis management to predictive and proactive decision-making. Participants noted that existing monitoring systems often generate delayed information because they rely on manual sampling, laboratory analysis, and fragmented monitoring networks. As a result, pollution events are often identified only after ecological or public-health impacts have already occurred.

Participants discussed how Digital Twins and AI-enabled virtual sensors can complement conventional monitoring systems by integrating historical datasets, laboratory validation, IoT observations, remote sensing inputs, and predictive analytics to generate near real-time insights. The ongoing deployment of an AI-enabled Digital Twin for the Yamuna River by CEEW and NatureDots was discussed as an example of how AI systems can extend monitoring coverage across river stretches where continuous physical monitoring infrastructure does not exist.

The discussion highlighted that AI systems are particularly useful in environments where pollution loads vary rapidly across time and space. Participants referred to recurring ammonia contamination events in the Yamuna River, where sudden spikes in pollution have affected water treatment operations in Delhi. Such examples were used to demonstrate the need for predictive systems capable of generating early warnings and enabling preventive interventions before crises emerge.

Participants also discussed how climate variability, extreme rainfall events, changing river flows, and temperature fluctuations are increasing uncertainty in water systems. AI-enabled forecasting and predictive analytics were therefore viewed as important tools for improving preparedness and adaptive management.

3.2 Groundwater, surface water, and local calibration challenges

The discussion also explored the role of AI and machine learning in groundwater and surface-water management. Participants highlighted persistent limitations in groundwater monitoring due to sparse datasets, inadequate monitoring networks, and scale mismatches between available data and planning requirements.

Examples from groundwater forecasting initiatives in Punjab and Karnataka were discussed to illustrate how AI models may perform differently under varying hydrogeological conditions. Participants explained that alluvial aquifer systems generally offer more predictable behaviour compared to hard-rock aquifers, where groundwater dynamics are considerably more complex. These examples reinforced the importance of calibrating AI models to local environmental, hydrological, and socio-economic conditions.

Participants repeatedly emphasised that AI systems should complement rather than replace conventional scientific methods. Laboratory testing and field observations were considered essential for validating AI-generated outputs, particularly for parameters such as heavy metals, microbial contamination, and detailed chemical analysis.

4. Theme 2: Governance, Adoption, and Community-Centred AI

The second thematic session focused on governance systems, institutional coordination, participatory approaches, and the long-term adoption of AI-enabled water-governance systems.

4.1 Scaling AI-enabled water governance requires stronger institutional coordination and data-sharing systems

A recurring theme throughout the discussion was that governance challenges often outweigh technological limitations. Participants noted that large volumes of water-related data are already generated across multiple agencies; however, datasets often remain fragmented, inaccessible, and poorly integrated.

Participants observed that multiple organisations monitor water quality, sewage systems, river flows, and drainage networks independently, yet there are limited mechanisms for integrated data sharing and coordinated decision-making. The discussion highlighted that AI-enabled systems will only be effective if accompanied by robust governance structures, clear institutional responsibilities, and interoperable data systems.

Participants also emphasised the need for transparent and scientifically robust predictive systems. AI models should not function as opaque ‘black-box’ tools but instead provide interpretable outputs that decision-makers and communities can trust and understand.

4.2 Accessible and actionable water intelligence is essential for participatory governance

Participants repeatedly stressed that communities and local stakeholders do not necessarily require large volumes of technical data. Instead, they require concise, timely, and actionable information that directly supports decision-making.

Examples from tank and pond management initiatives demonstrated how AI-enabled monitoring systems could help communities monitor dissolved oxygen, algal growth, evaporation patterns, and fisheries-related risks. Participants noted that the value of AI lies not merely in generating more data, but in helping communities understand whether water is safe, whether irrigation decisions should change, or whether fisheries face immediate ecological risks.

Representatives also discussed community-based groundwater quality initiatives in regions affected by fluoride and arsenic contamination. The discussion highlighted how timely and understandable information can influence behavioural change and improve public-health outcomes.

Several participants emphasised that successful implementation of AI-enabled water-governance systems will depend not only on technological sophistication, but also on the development of user-centric and interpretable tools that communities can easily understand and operationalise. Simplified dashboards, local-language interfaces, WhatsApp-based advisories, and citizen-science platforms were discussed as important pathways for improving adoption.

4.3 Trust, transparency, and long-term sustainability

The roundtable also explored questions related to trust, affordability, and long-term sustainability of AI-enabled monitoring systems. Participants observed that adoption depends not only on technical accuracy, but also on transparency, engagement, and demonstrated reliability over time.

Questions were raised regarding the operational sustainability of monitoring systems once pilot projects conclude. Participants discussed challenges associated with damaged equipment, maintenance costs, institutional capacity, and long-term financing arrangements.

The discussion concluded with an exchange on the reliability of virtual sensors and Digital Twins. Participants highlighted that virtual sensors generate model-derived outputs rather than direct physical measurements and therefore require rigorous calibration and continuous validation against ground-truth observations. While AI systems offer important opportunities for expanding monitoring coverage, maintaining scientific credibility and trust remains essential.

5. Cross-Cutting Insights

1. AI has significant potential to address longstanding gaps in water monitoring and decision-making.
2. Digital Twins and virtual sensors can extend monitoring coverage while reducing dependence on physical infrastructure.
3. Predictive systems can help shift water governance from reactive responses to anticipatory planning.
4. Governance reform and institutional coordination are as important as technological innovation.
5. Community participation and user-centred design are essential for successful implementation.
6. AI systems must be calibrated to local environmental and hydrological conditions.
7. Trust, transparency, affordability, and long-term sustainability remain critical determinants of adoption.
8. Effective water governance requires combining technological innovation with local knowledge, institutional capacity, and community engagement.

6. Roundtable participants and Organizations

1. Dr. Ashutosh Pati, Centre for Study of Science, Technology and Policy (CSTEP)
2. Dr. Chandrashekhar Vishwakarma, TERI School of Advanced Studies
3. Mr. Akash Jaiswal, TERI School of Advanced Studies
4. Ms. Kangkanika Neog, Sattva Consulting
5. Dr. Abhishek Kumar, SRM University
6. Mr. Jaidev Joshi, International Union for Conservation of Nature (IUCN)
7. Mr. Kim Hor Toh, SMEC
8. Mr. Bishwadeep Ghose, Water for People
9. Mr. Salahuddin Saiphy, SM Sehgal Foundation
10. Mr. Sam Kapoor, SM Sehgal Foundation
11. Mr. Deepak Gupta, Arghyam
12. Ms. Anna Brittas, National Institute of Urban Affairs (NIUA)
13. Mr. Ashok Kumar Biswal, HCL Foundation

14. Dr. Anusmita Das, Indian Institute of Technology Hyderabad (IIT Hyderabad)
15. Mr. Sanjay Banka, Banka BioLoo Limited
16. Ms. Shilpi Singh, IBTI
17. Ms. Snehal Verma, NatureDots Private Limited
18. Ms. Jyoti Matolia, NatureDots Private Limited
19. Ms. Gitika Goswami, IFAD
20. Mr. Vaibhav Chugh, Council on Energy, Environment and Water (CEEW)
21. Dr. Suparana Katyaini, Council on Energy, Environment and Water (CEEW)
22. Dr. Neerav Sharma, Council on Energy, Environment and Water (CEEW)
23. Mr. Arnav Mathur, Council on Energy, Environment and Water (CEEW)
24. Mr. Nitin Bassi, Council on Energy, Environment and Water (CEEW)
25. Dr. Munish Kumar Upadhyay, Council on Energy, Environment and Water (CEEW)
26. Mr. Kartikey Chaturvedi, Council on Energy, Environment and Water (CEEW)
27. Mr. Kunwar Chaitanya Sah, Council on Energy, Environment and Water (CEEW)
28. Mr. Mohammad Aatish Khan, NatureDots Private Limited
29. Dr. Durgesh Kumar Singh, Council on Energy, Environment and Water (CEEW)
30. Ms. Shivani Mehta, Indian Institute of Delhi (IITD)

7. Conclusion

The roundtable highlighted both the promise and the limitations of AI-enabled approaches to water governance. While Digital Twins, virtual sensors, and predictive systems offer significant opportunities for improving monitoring, planning, and evidence-based decision-making, participants consistently emphasised that technology alone cannot solve water-governance challenges.

The discussion reinforced the need to combine technological innovation with strong governance systems, contextual scientific understanding, institutional collaboration, transparency, and meaningful community engagement. Participants expressed strong interest in continued collaboration, pilot-based learning, and knowledge sharing to further strengthen the role of AI-enabled systems in sustainable water governance and river management in India.